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COASTAL ZONE MANAGEMENT STUDY

U.S. DEPARTMENT OF COMMERCE NOAA COASTAL SERVICES CENTER 2234 SOUTH HOBSON AVENUE CHARLESTON, SC 29405-2413 The preparation of this report was financially aided through a grant from the Washington State Department of Ecology with funds obtained from the National Oceanic and Atmospheric Administration, and appropriated for Section 306 of the Coastal Zone Management Act of 1972.

JUNE, 1977



Kramer, Chin & Mayo, Inc. Consulting Engineers, Architects, Applied Scientists 1917 First Avenue, Seattle, Washington 98101



June 29, 1977

KCM #054-1

City of Bellingham 210 Lottie Street Bellingham, Washington 98225

ATTENTION:

Mr. Greg Waddell

Planning Director

REFERENCE:

Coastal Zone Management Study

Gentlemen:

In compliance with our contract for consulting services dated May 11, 1977, we at Kramer, Chin & Mayo, Inc. are pleased to submit the following report entitled City of Bellingham Coastal Zone Management Study.

This report is intended to update the City's existing Shoreline Master Program through the development of specific regulations and policies regarding future waterfront development. Emphasis has been to increase and improve the opportunities for public access to the waterfront while accommodating the limited expansion needs of water-related industry. Recommended land uses and locational and design regulations are presented for Bellingham's shoreline between Post Point on the south and Columbia Cement Company Pier on the north.

We sincerely appreciate the assistance provided us by the City and Port of Bellingham throughout this study and feel that without the cooperation we received, the project would probably not have been completed within the short time period allowed.

We have enjoyed the opportunity to conduct this study and would be pleased to further assist you in implementing or expanding upon the recommendations developed.

Very truly yours,

V H. WALLON

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ACKNOWLEDGEMENTS

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BELLINGHAM COASTAL ZONE MANAGEMENT STUDY

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SUMMARY

The purpose of the Coastal Zone Management Study has been to refine, enhance and, where necessary, to modify the City of Bellingham Shoreline Management Master Program by making a careful examination of existing conditions and potentials and by recommending specific regulations and policies for specific sites in order to control future development. The objectives have been to increase and improve both the opportunity for public access to the waterfront and the City's focus on the waterfront while at the same time accommodating limited expansion needs of the industry.

The primary study area extended from Post Point on the south to the Columbia Cement Company Pier on the north. The focus was on the shoreland area extending 200 feet back from the ordinary high water mark, although the study area's relationships to the region, Bellingham Bay, and the remainder of the City were also considered.

The initial phase of the study involved gathering background information including: research into current literature, plans, reports, and studies in progress; interviews with public officials and representatives of industry; and, personal inspection and observation of existing conditions. The results of the initial phase included identification of major problems or areas of concern and the identification of limiting factors or constraints on future development. Identification of limiting factors required determination of existing public and private plans, existing water-dependent and non-water-dependent uses, existing development, environmentally important areas and other planning considerations such as slopes and soil conditions.

In order to define and examine land use alternatives, the study was divided into four sub-areas:

- South Terminal (Post Point to Uniflite)
- Boulevard (Reid Boiler to North Terminal)
- Whatcom (Georgia-Pacific to I&J Waterway)
- Squalicum (Squalicum Expansion to Columbia Cement Company Pier)

Prior to defining alternatives, planning considerations for each type of potential waterfront activity and each type of water-dependent industry were outlined. Public and industrial uses on suitable sites within each sub-area were then located, being mindful of the overall pattern of land use and the previously stated objectives to increase public access and accommodate limited industrial expansion. In some land use alternatives there was a public emphasis and in others an industrial emphasis. The use of fill was considered where it would not cause significant adverse environmental impacts but where there could be significant benefits in terms of public access and orderly industrial growth. Two alternatives for each sub-area were defined. Each alternative was then examined with regard to major potentials and problems. This examination led to recommended land uses and development regulations for each study area.

Beginning at the south end of the study area, the recommended land use evolves from no change in the Post Point area to limited park development at the tidal lagoon adjacent to the City Sewage Treatment Plant. At the South Terminal, an industrial emphasis is recommended but with consideration to its relationship with the Fairhaven Business District and surrounding residential areas. Limited public access provided along Padden Creek with potential views of industrial activities. If needed, approximately two-thirds of the Padden Creek mudflats could be filled for industrial or related uses. The existing public boat launch should be retained.

Emphasis within the Boulevard sub-area is on recreation and public oriented commercial development such as shops and restaurants. Except for the North Terminal, existing industry in this area is non-water dependent. Due to topography and water depths, it would be difficult to establish truly water-dependent use without significant modifications to the shoreline area. The proposed focal points are the Boulevard Park (recreation) and Railroad Pier (commercial/recreation) on the south, and a proposed Tour Center and Alaska Ferry Terminal on the north. Between the proposed North Terminal Tour Center and Boulevard Park, a combined commercial/residential development is proposed in lieu of current industry. This development could be related to the Tour Center and could eventually extend on fill to the south. If the Tour Center does not become a reality, then continued industrial use

of this area may be desirable with no fill allowed to the south. However, in either case, there could be fill adjacent to and southwest of the existing North Terminal provided fill does not extend past the existing pier at the west end of the Terminal. This fill could be used either to expand the Tour Center or expand industrial space.

No major changes are recommended for the Whatcom area. The Whatcom Creek Park should be developed generally as proposed with related commercial uses between Holly Street and Roeder Avenue. Georgia-Pacific and the Whatcom Fill are to continue as industrial areas with potential expansion space recommended on the seaward end of the Whatcom Fill. This expansion area could also be used for increased public access and dry land boat storage but the extent of fill should not be allowed to conflict with the proposed Squalicum Harbor Expansion Project.

Land use recommendations in the Squalicum sub-area are oriented to the pleasure boat harbor at the east end, a commercial fishing and fish processing center in the middle and a relatively natural recreation area at the west end. In this sub-area, potential fill areas are the Squalicum Harbor Expansion Project, the Squalicum Creek area, and the Mt. Baker Plywood area. The maximum recommended extent of fill near Squalicum Creek is the boundary of the current Squalicum Waterway. In connection with any fill in this area, additional consideration should be given to relocating the creek channel to the east. The extent of fill in the Mt. Baker area will depend upon protection of the gravel beach to the west.

A major recommendation of this study is that no fill be allowed in any area unless it is for a water-dependent use. Also, in no case should fill be allowed without prior consideration to relocation of adjacent non-water-dependent businesses to satisfy added space requirements.

Land use recommendations were necessarily developed in this study to provide a partial basis for modifications and additions to the existing shoreline program. The recommended modifications involve changes in a few shoreline environment designations to permit fill and urban uses. These include modification of the Padden and Squalicum Creek areas from Conservancy II to Urban II and modifications as necessary in the Boulevard area from Urban I to Urban II.

Once recommended land uses had been determined, separate land use areas were analyzed and development concerns identified. Specific regulations and/or policies were proposed to enable the City to better respond to proposals for shoreline development. The regulations include limits as to the locations and extent that fill should be allowed along the shoreline of the study area. Potential fill areas were mentioned previously in the discussion of recommended land use. Unless mentioned as a potential fill area, the remaining areas are recommended as no-fill zones. Other proposed regulations or policies involve recommended treatment along the land/water interface, type of fill, beach maintenance, coastal zone surveillance and monitoring, specific locations for public access, priority relocations of certain non-water-dependent activities and in certain cases restrictions on height and bulk of new development in addition to those restrictions established in the City's 1974 Shoreline Program. Potential coastal area disposal sites for dredge spoils are also discussed. However, this subject is currently being analyzed by the Corps of Engineers with an environmental impact statement to be published in the near future. The Corps analysis should establish some safe spoil sites within the study area.

The regulations and policies presented in this study are proposed to be added to the City's Shoreline Master Program. It is understood that prior to adopting any of the regulations or policies, the process of updating the master program will allow for general public review, discussion and input. The land use recommendations presented here are proposed for consideration during the City's preparation of a new comprehensive plan. This will allow for the public review, discussion and input which was not possible during this study.

BACKGROUND

SECTION I

CHAPTER 1 INTRODUCTION

1. STUDY PURPOSE AND OBJECTIVES

The purpose of the Coastal Zone Management Study is to refine, enhance and, where necessary, to modify the City of Bellingham Shoreline Management Master Program by making a careful examination of existing conditions and potentials and by recommending specific regulations and policies for specific sites in order to control future development. The objectives are to increase and improve the opportunity for public access and the City's focus on the waterfront while at the same time accommodating limited expansion needs of industry.

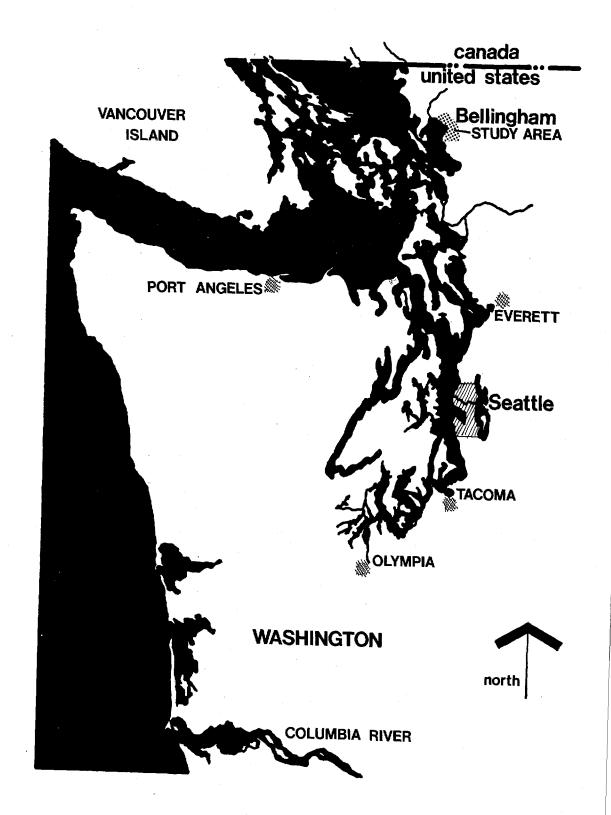
The study was authorized by the City on May 11, 1977 and was completed on June 29, 1977. Without the complete cooperation of the City of Bellingham, the Port of Bellingham, and landowners and industries located within the study area, it would not have been possible to complete the study within this short time period.

BACKGROUND

The City of Bellingham is located in Whatcom County and lies on the shore of the Puget Sound - Strait of Juan de Fuca - Georgia Strait complex (Figure 1). The region is influenced by the surrounding geographical features including the Cascade Mountains to the east, marine waters to the west, and freshwater streams and lakes throughout. The climate is moderated by prevailing westerly winds associated with air masses which have their origins in the Pacific Ocean. Summers are characteristically warm and dry, and winters are mild and wet. (1)

Economic activity in the region was originally oriented toward natural resources, including forestry, minerals and fishing. Coal mining had a sporadic influence on the economy until 1955. Fishing was once a dominant industry in Whatcom County, and at one time over two-thirds of all Puget Sound fish processing was in Bellingham. Forestry has also played a dominant role in the economic base.

In the mid 1950's the pattern of economic development took a substantial change in direction with the construction of a major oil refinery at Cherry Point. In addition, other minor manufacturing activities gradually developed, including boat building and repair, plastics manufacturing, and electronic components. Forestry and its related processing and manufacturing still play a major role in the economy with the pulp and paper operation of the Georgia-Pacific Corporation. In recent years, recreation and tourism have become economic factors; furthermore, there is a growing volume of shopping by Canadians. Western Washington State College also has a strong economic and social impact on the entire community. (2)



LOCATION MAP

CHAPTER 2 THE CITY

Bellingham is situated on the northeast shore of Bellingham Bay and is a major city in Whatcom County with 48 percent of the population as of April 1970. The population of Bellingham has grown steadily since 1910, although it did show periods of plateauing during the 1930's and 1950's due to economic declines. (3) The 1975 population is estimated at 41,000. (4) The Office of Program Planning and Fiscal Management has estimated the 1977 population to be 43,160.

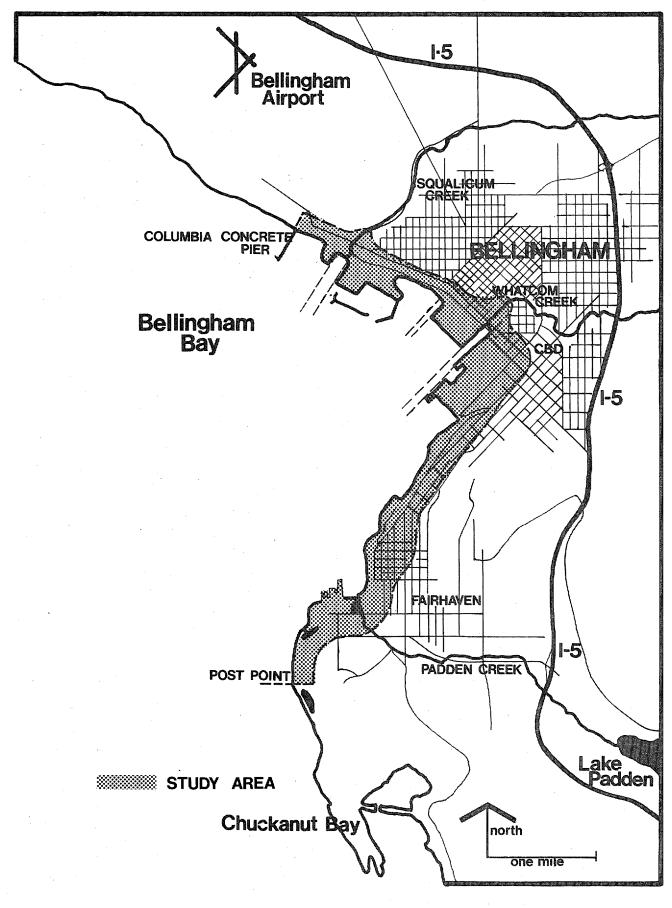
As shown in Figure 2, the geographic setting of the City allows access by shipping as well as by highway and railroad systems. Bellingham is 108 nautical miles from the Pacific Ocean; it is 80 miles north of Seattle, 22 miles south of the Canadian border, and 55 miles from Vancouver. British Columbia. The Bay is about 12 miles long and 3 miles wide, open to the south and southwest. The harbor approaches range in depth from 96 to 24 feet, except in the northern part where tide flats merge with the delta of the Nooksack River. Tide and current changes are minimal; the prevailing winds are from the southeast, although summer westerlies and winter northerlies occur. Deepwater vessels pilot the Strait of Juan de Fuca, Haro Strait, Strait of Georgia, Bellingham Channel, and Rosario Strait for access, while shallow draft vessels may pass through the Swinomish Channel and Hale Passage. Berthing facilities in the Bay are located at the Whatcom Creek Waterway, I and J Street Waterway, Squalicum Creek Waterway, and at the Port of Bellingham's North and South Terminals. Railroads connecting with Bellingham are the Milwaukee Road and Burlington Northern. (5)

Although Bellingham has exceptionally good access by water and is closer to British Columbia and the Pacific Ocean than most Puget Sound ports, it is hampered by lack of a large hinterland. The Canadian border, the mountain ranges, the greater size of Seattle and Vancouver with their more populous hinterlands, transportation connections, and commonwealth ties, have combined to prevent Bellingham from becoming a major port and city. Bellingham's hinterland is confined essentially to Whatcom County. Bellingham is not a transshipment point with rail and air connections

to large consumer areas; it is at one end of the United States transportation system. Nevertheless, within these limits, the Port and City of Bellingham have grown during the past 50 years. (5)

The Port's growth has resulted in substantial changes to the shoreline of Bellingham Bay in the form of dredging for ship navigation channels and fill for industrial development. The shoreline of Bellingham Bay has become dominated by industry with very minimal public access to the water's edge. Beyond the shoreline zone of Bellingham Bay, the land is characterized by steep hillsides rising from sea level to elevations exceeding 1500 feet which allow views of Bellingham Bay and the surrounding area.

In addition to the adjacent marine waters, there are three streams which flow through Bellingham and empty into Bellingham Bay: Squalicum Creek, Whatcom Creek, and Padden Creek. Portions of Lake Whatcom and Lake Padden lie within the City limits and in general are presently more oriented to public recreational use than is the inner City shoreline of Bellingham Bay.



VICINITY MAP

FIGURE 2

CHAPTER 3

DEFINITION OF THE STUDY AREA

1. FEDERAL COASTAL ZONE MANAGEMENT ACT OF 1972:

Federal Guidelines (15 CFR Part 920) for the CZM Act of 1972 define the coastal zone as follows: "The coastal zone for management purposes extends inland only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters. However, the States are encouraged to take early and continuing account of existing Federal and State land/water use and resource planning programs. In addition, States may wish to anticipate a national land-use policy, including its application in their State, unless the State coastal zone management program applies to the entire State. States may also wish to anticipate the desired coordination between the coastal zone and proposed land use or broad resource management programs. Examples of some related statewide policies and programs which will affect and should be considered in making determinations under the Act include: Energy policy, siting of power plants and other major water-dependent facilities, surface and subsurface mineral extraction controls, overall land and water conservation policies and many others."

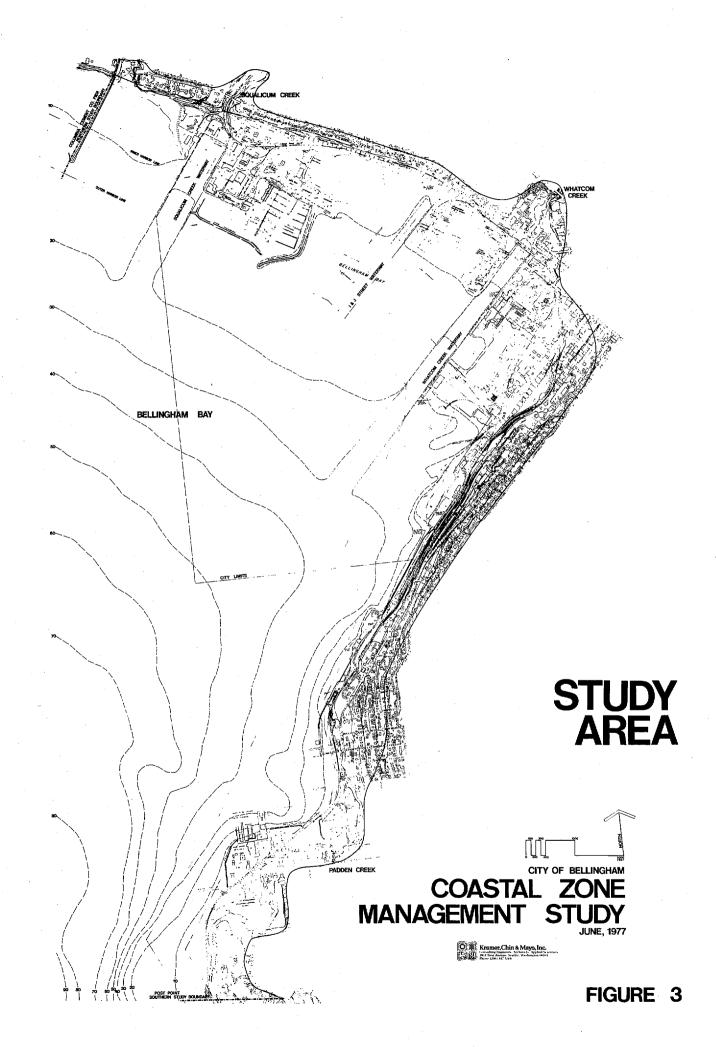
2. STATE OF WASHINGTON

Washington State's definition of the coastal zone includes the marine waters and their associated wetlands and those uplands 200 feet back from the ordinary highwater mark. It also extends seaward for three miles and upstream to the limit of salt water intrusion. This definition encompasses a similar area to that protected by the State Shoreline Management Act, except as regards to the distance seaward from the shoreline.

3. BELLINGHAM CZM STUDY

For purposes of this study, the Bellingham Coastal Zone is defined as that area extending from the Columbia Cement Company pier on the north

to Post Point on the south. This area is shown in Figure 3. Consideration has also been given to the City's coastal zone from Post Point south to the City limits. The focus of the study is on shoreland area extending 200 feet back from the ordinary high water mark. This area as defined in the State's Coastal Zone Management Program includes those land uses which have a direct and significant impact on coastal waters. Washington State's Coastal Zone Management area also extends to the limit of salt water intrusion in rivers and streams. Streams within the study area include Padden Creek, Whatcom Creek, and Squalicum Creek. For purpose of this study, the upland boundary of Padden Creek is defined as Harris Street. For Whatcom Creek, the upland boundary is defined as Whatcom Falls; and for Squalicum Creek, it is defined as the eastern edge of Roeder Avenue.



CHAPTER 4 SHORELINE HISTORY

The history of Bellingham Bay extends back centuries when Indians used the Bay for transportation. White men later began to explore the area, and by 1853 Henry Roeder and Russell Peabody started a sawmill at Whatcom Creek. From that point on, the white man's establishment in the area grew. A paper by Hitchman in 1972 gave a historical report on the Port of Bellingham. (5) The section of that report which outlines physical development is summarized here. The history of development is graphically represented in Figure 4.

In 1892 the federal government approved three waterways in the harbor: Whatcom Creek, I and J Street, and Squalicum Creek. These areas were marked for future dredging, bulkheading, and piers. Between 1904 and 1910, Whatcom Creek Waterway was dredged, and much of the area around the head of the waterway was fitted for street development.

In 1920, activity on Bellingham Bay was dominated by private interests including fisheries and wood mills. At the same time, the voters of Whatcom County created a Port Commission with jurisdiction covering the County. In 1921 and 1922 the Port Commission, with consultation from the Army Engineers and railroad managers, prepared a comprehensive plan of harbor development. Three units or areas were planned on Bellingham Bay in the vicinity of: 1) Taylor Avenue on the south side, 2) Whatcom Creek Waterway, and 3) Squalicum Creek Waterway. In 1924 the commission purchased the Municipal Dock on Whatcom Creek Waterway which had been built in 1918. Following this purchase, the dock was extended and there was further dredging of Whatcom Creek Waterway.

In 1926, the Port adopted a plan to build wharves and dredge the Squalicum Creek area. A 22-acre site was filled; and a breakwater, marine ways, a webhouse, and moorage for fishing boats were built. In 1933 and 1934, the Port deepened the water around Squalicum fill and built breakewaters along its front. The Port did allow a bathing beach at Squalicum's west side during the interwar years, so long as it did not interfere with the commission's stated focus on industrial and shipping facilities.

During World War II, the Port Commission secured voter approval for expanding the small boat harbor at Squalicum and building a cold storage plant. In 1947, the Port Commission continued expansion with the purchase of the Bloedel Donovan Mill site which was filled in preparation for industrial leases. Expansion of Squalicum Bay boat harbor was carried out; and by 1958, the capacity reached 500 boats.

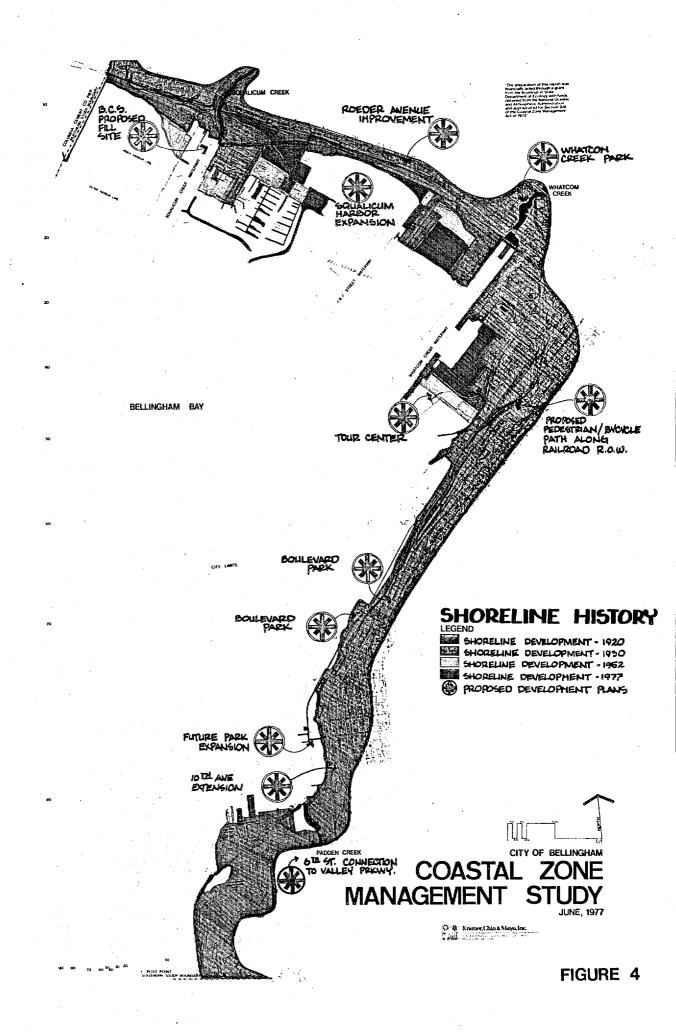
In 1962, the Port issued bonds to improve and expand its ocean shipping terminal on Whatcom Creek Waterway. The expansion program lengthened the port dock, dredged in front, filled behind for storage area, built an office building and railroad spur, and waged a sales program to attract shipping and industry.

In 1966, the Port acquired additional area to ensure a deepwater dock on the south side with rail and truck connections. Between 1968 and 1970 the Port built a small recreation park and boat launching ramp on the south side.

As the Port attracted industry with its land and facilities, it also became aware of pollution. Beginning in 1962, Port officials studied pollution data, put anti-pollution clauses in leases, and asked the state for guidelines. Bellingham Bay appeared polluted in 1967, but the Port had no policing powers; these were exercised by the State Department of Ecology.

By 1970, the Port of Bellingham owned about 2000 acres of property, with 500 acres available for industrial site development. This area amounted to about one-quarter of the waterfront within the city limits of Bellingham. The Port's credit and organization capability facilitated the virtually steady physical development of the Port since the commission's creation. (5)

Since 1970, two additional changes in the shoreline have been noted. In 1974, the dumping of waste material to the sanitary landfill bordered by Roeder and Hilton Avenues was ceased. Impacts associated with its presence continued in the form of leachate seepage directly into Bellingham Bay. The direct discharge via pipe has since been stopped. (6) An additional small fill area has also been established along the shoreline by Georgia-Pacific.



EXISTING CONDITIONS-PHYSICAL AND HUMAN ENVIRONMENT

SECTION II

CHAPTER 5

EXISTING PHYSICAL CONDITIONS

1. BELLINGHAM BAY

Bellingham Bay is closely associated with Samish Bay and together they form a part of the larger Puget Sound - Strait of Juan de Fuca - Georgia Strait marine waterway system. On the west shores of Bellingham Bay are Lummi Island and the Lummi Indian Reservation which extends northward. The City of Bellingham is on the northeast corner of the bay (Figure 1).

1.1 Bathymetry

The major bathymetric features influencing the oceanographic conditions in the area are the tidal flats to the north and the channels connecting Bellingham Bay directly or indirectly with Rosario Strait.

The largest of these channels is located south of Lummi Island where the average depth is 239 feet. Compared to the connecting channels, the bay is relatively shallow, with depths of less than 89 feet in most of the area (Figure 5). Large tidal flats extend along the north shore of the bay created by sediments from the Nooksack River. (7)

The natural bathymetric features have been altered by dredging to allow for deep water vessel transportation within the bay. Continued dredging must occur in the federal waterways to maintain access to industries located near the northern port terminal. Location of existing waterways is shown in Figure 3.

1.2 Freshwater Sources

The drainage basin supplying freshwater to the Bellingham and Samish Bays extends into the Cascade Mountains and is therefore influenced by snowmelt as well as direct precipitation. The Nooksack River enters Bellingham Bay at the north end, and three creeks, Squalicum, Whatcom, and Padden, enter the bay within the boundaries of the study area. Squalicum Creek drains a small area of land between the Nooksack River and the City

of Bellingham. Whatcom Creek is the outlet to Lake Whatcom and discharges into a dredged waterway alongside the Georgia-Pacific Mill. Padden Creek is the outlet to Lake Padden and enters Bellingham Bay just north of Post Point.

1.3 Tides and Currents

Collias and Barnes have studied Bellingham Bay extensively. The following description of oceanographic features have been taken from their report.

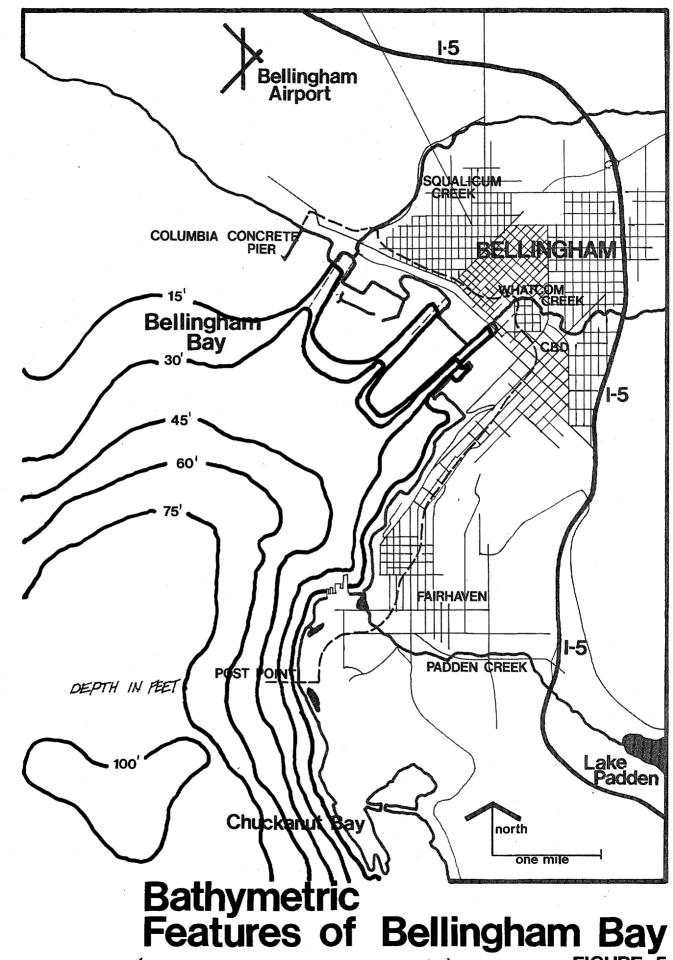
The tides in the Bellingham - Samish Bay system are of the mixed type, with two unequal highs and two unequal lows per tidal day. Tidal currents are important in transporting sediments from one part of the system to another and also control mixing of water of different origin. The direction and magnitude of the movement depend largely upon the tide state, tide range, and bathymetry of the particular location. The normal maximum tide range is 13 feet and mean tide height is 5.2 feet above MLLW (mean lower low water). (7)

The inferred flood-current pattern is shown in Figure 6. In general, the current speeds are less than 0.3 meters/second except in Bellingham Channel and Hale Passage. Although fewer measurements of current were made on ebbtide, it appears that circulation in upper Bellingham Bay is the reverse of that during flood tide. These inferred patterns may be expected only in the absence of winds. (7)

Flushing time is an indication of the rate of mixing, and for upper Bellingham Bay (North of Post Point) the time varies from one to ten days with an average of four days. This figure indicates the average time a particle of freshwater will remain in the upper layer before being removed from the system. A flushing time of two days was computed for the inner harbor of Bellingham Bay during summer months. (7)

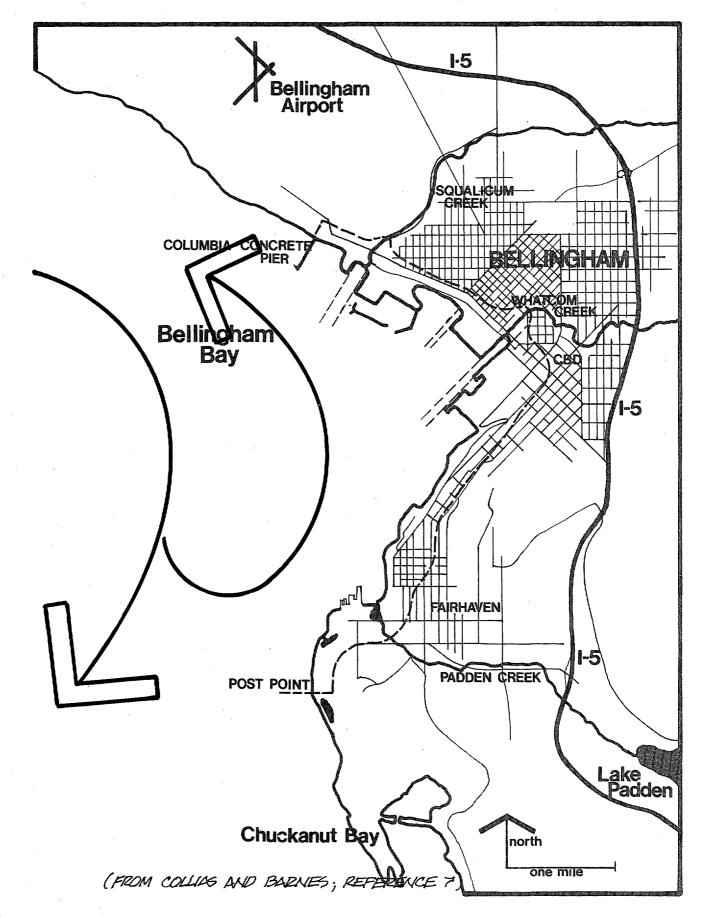
1.4 Sediment Characteristics

Most of Bellingham Bay's bottom surface is fairly uniform in character, with sediments tending to be more silty toward the Nooksack River. Three areas of the bay have sediments differing from the uniform mud: 1) just



(FROM COLLIAS AND BARNES; REFERENCE 7)

FIGURE 5



Inferred Flood - Current Pattern

CIRCULATION IN UPPER BELLINGHAM BAY REVERSES DURING EBB-TIDE

FIGURE 6

east of Eliza Island is a trench with sandy, organic sediment material;
2) near Post Point sediments are more sandy and gravelly; and 3) the
inner harbor area where surface conditions appear anaerobic with a high
content of wood chips, wood fiber, and a high mercury and organic content.
Sediments in the inner harbor have been modified from their natural state
by dredging, construction dumping, industrial and municipal discharge, and
log storage rafts. (6)

Sediment characteristics in all of Bellingham Bay are controlled by a combination of factors, primarily sediment deposition from the Nooksack River. Between 1891 and 1960 the river delta front advanced seaward one-half mile. The 70-year (1891-1960) average of sediment delivery was 9 x 10⁵ cubic yards/year. The present rate is 8.5 x 10⁵ cubic yards/year. (8)

Marine action, including wind waves and tidal currents caused by high tidal range, is strong enough to redistribute the sediment deposited by the river thus controlling the sediment distribution in the bay and the shape of the delta. The delta is continually smoothed by waves, resulting in a blanket of well-sorted sand incised by numerous shallow distributary channels. Over time, the delta has grown seaward by the steady advance of delta front rather than by localized extensions of river channels growing into the bay. (9)

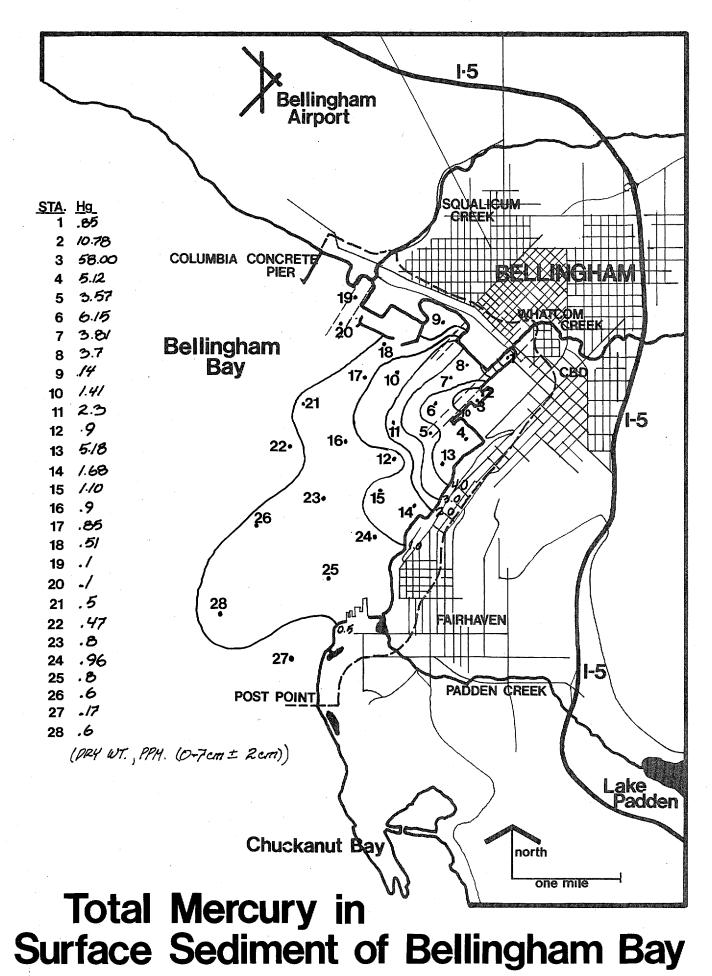
The sediment load delivery rate is likely to increase in the future due to increasing runoff rates associated with the construction of agricultural drainage ditches, drainage tiles, dikes and continued logging activities. Scouring due to the greater discharge deepens the channel and further increases sedimentation.

A study of the sediment composition was done based on a coarse-fraction analysis (fraction size > 62μ). It was found that five constituents account for 95 percent of the course fraction of all sediments in the bay. These five are: (a) wood fragments originating from log rafts adjoining the pulp mill, (b) shell fragments, (c) foraminifera tests (calcareous material), (d) clay galls (originating on the deltas and carried over the delta platforms by rivers), and (e) terrigenous sand transported into the area by the Nooksack and Samish Rivers. (9)

The mercury content of the sediments in Bellingham Bay has been studied extensively in relation to the possible hazards to life systems. An unpublished study by R.S. Babcock and D.C. Williams (10) reported on the mercury in sediments and marine organisms of Bellingham Bay. The sources of mercury were found to be from natural processes of sediment distribution from the Nooksack River and industrial discharge directly into Bellingham The Nooksack River, which drains areas of recent volcanic and hydrothermal activity, has introduced large amounts of mercury-bearing sediment over time. From 1965 to 1970 the outfall of the Georgia-Pacific chlor-alkali plant discharged wastewater containing 10 to 15 pounds of mercury per day into Bellingham Bay. This intense mercury loading was thought to have been distributed over a large portion of the bay, with concentrations decreasing concentrically away from the discharge point. (10) The distribution of mercury values in surface sediments of Bellingham Bay as measured during summer of 1974 and presented by Nelson is shown in Figure 7. Mercury levels from 0.1 ppm to 58.0 ppm were found throughout Bellingham Bay. The figure shows mercury decreasing with distance from sites 2 and 3 to background levels (site 29) which are approximately 0.3 ppm in the bay. The highest levels of mercury were found near the log pond adjacent to Whatcom Waterway where the Georgia-Pacific chlor-alkali plant discharged mercury waste between 1965 and 1970. Stations 2 and 3 were located approximately 50 feet into the log pond from the edge of the waterway. (11)

The surface sediment values presented above are significantly lower than those reported by Lee in 1971. His highest value was 9,348 ppm, measured near the outfall three months after curtailment of the mercury discharge. (11)

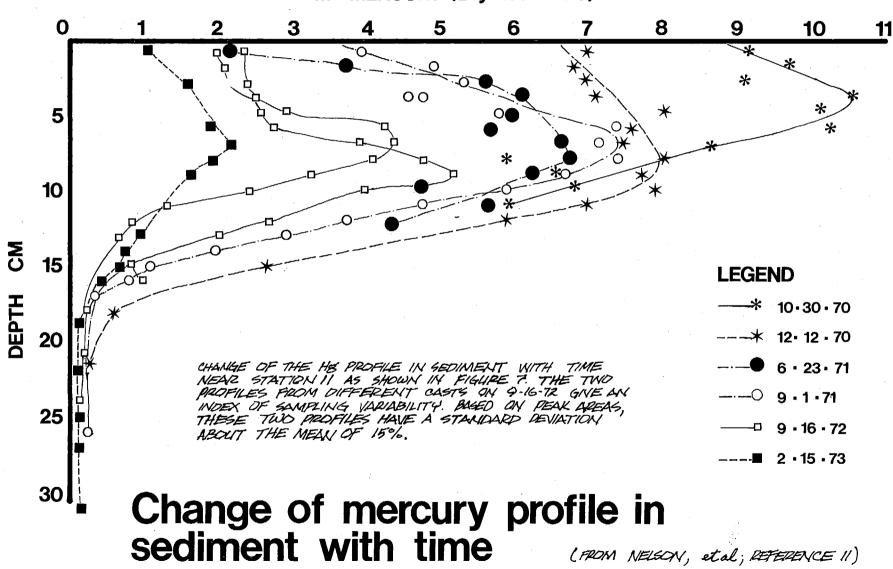
Bothner (1973) has recorded the loss of mercury from the sediment as well as the depositional history of the mercury in the sediment. He has calculated that the mercury is leaving the sediment at a half-life of 1.3 years. The data he collected is presented graphically in Figure 8. The sampling site corresponds closely with Station 11 as shown in Figure 7. Note that the mercury levels increase with depth and then rapidly decrease to background (pre-industrial) levels. This depth (approximately 15 cm) corresponds to the 1965 surface sediment depth, when Georgia-Pacific's chlor-alkali plant began operation. Also note the over-all decrease in mercury levels. Surface sediments decreased from 9 ppm to 1 ppm in 1.33



(FROM NELSON, etal; REFERENCE 11)

FIGURE 7

STATION 3
PPM MERCURY (Dry Wt. Basis)



years. This rate is much faster than the calculated rate of biological methylation could account for. Possible sources of error include collection technique and the extensive presence of wood fragments at some sites. (11)

Biological methylation of mercury involves the transformation of inorganic mercury with a low food chain transfer efficiency to an organic form (predominantly methyl mercury) with a high food chain transfer efficiency. The transformation is made primarily by sediment bacteria and results in higher water solubilities and greater uptake by benthic macroinvertebrates, initiating the food chain or food web accumulation of mercury.

Babcock's study states that the hazard to marine organisms continues to be a problem since all organisms in the contaminated marine environment can accumulate mercury and mercury derivatives. It is possible that biological magnification can result in dangerously high concentrations in some organisms on the higher trophic levels. (10) A similar study by Nelson which investigated mercury in the benthos of Bellingham Bay concluded that the amount of mercury in the organisms was not generally accumulating in unsafe amounts with respect to the human consumption of the fish that feed on these benthic organisms. However, the report also states that fish feeding in Whatcom Creek Waterway and adjacent to the marina might exceed the F.D.A. safety level for consumable fish. (11)

Another consideration with respect to mercury content of the sediments is that involving the disposal of dredge spoils. Considerable care in the disposal of dredge hauls from Whatcom Waterway and other sections of the Bellingham waterfront is deemed necessary to control redistribution of the mercury into the environment.

2. SHORELINE

There are seven and a quarter (7 1/4) miles of shoreline within the CZM study area. Nearly the entire length has been filled or modified for the purpose of industrial growth or for railroad right-of-way. The railroad had the first major impact on the natural shoreline of Bellingham Bay during the late 1800's; it essentially circled the entire waterfront with trackage and fill which effectively separated the public from use of the waterfront.

Industrial development along the shoreline has continued steadily since the establishment of the Port commission in 1920. Currently the Port owns, leases and maintains two-thirds of the available waterfront within the CZM study area. (5) The industrial development has negatively impacted the environmental and visual quality of the shoreline. Debris has accumulated in the tidelands and the natural aesthetic characteristics of the shoreline have been severely degraded.

The tidelands are generally steep and narrow. There is no dry beach (accessible at nearly all tidal stages) within the study area except for 400 feet adjacent to the Columbia Cement Company Pier near the northern boundary of the study area. Southeast of this beach is located the Mount Baker Plywood fill area. From this point south to the North Terminal of the Port of Bellingham docks the shoreline consists of modified beaches (physically altered by man). The most noticeable modification is the filling of tidelands in the Whatcom Creek and Squalicum Creek areas. Over 200 acres of these shallow tidelands have been filled and are used primarily for industry. During early fill operations around Squalicum Creek, the water was diverted away from its natural channel, then later diverted again to its present course. As a result, a salt marsh approximately 5 acres in size was formed. Also located in the area between C Street and I and J Waterway is the former sanitary landfill site of the City of Bellingham which was used until late 1974. (6)

Continuing southwesterly from the Port of Bellingham docks, small pockets of natural beach are found. These beaches are sand to gravel and contain occasional outcroppings of sandstone. These conditions extend as far south as Uniflite Corporation. According to Webber, in areas near Uniflite and the North Terminal of the Port of Bellingham, fill is gradually eroding and exposing garbage that was used for fill. (6)

From Post Point south, the high intertidal area is modified by rip-rap fill used for the railroad right-of-way. Mid to low tide areas are cobble to rocky. In a number of locations the right-of-way has formed small lagoons. The lagoon at Post Point has open access to the bay and is a rich intertidal area, but little salt marsh vegetation occurs. (6)

3. WATER QUALITY

3.1 Bellingham Bay

The overall water quality classification of Bellingham Bay is designated as Class 'A' (Excellent) except for the inner harbor area east of Squalicum Harbor which is designated as Class 'B' (Good).

(Figure 9) The significance of these designations is their relationship to the uses assigned to the respective classifications. Class 'A' marine waters are characterized by the following uses: fisheries (salmonid migration and rearing, commercial fishing, and shellfish), wildlife, recreation including water contact, industrial water supply, navigation, and log storage and rafting. Class 'B' marine waters have similar characteristic uses with the exception that water contact recreation is not included. (12)

Prior to July 19, 1973, the innermost harbor was designated as Class 'C' (Fair). Characteristic uses of Class 'C' marine waters are salmon migration only (not rearing), recreational boating and fishing (not water contact), industrial water supply, and log storage and rafting. Commercial fishing and shellfish harvesting are not included in this classification. (12) The designation was upgraded to Class 'B' with adoption of the Department of Ecology Water Quality Standards in June of 1973. The water quality designation was changed in anticipation of the upgrading of the municipal treatment plant and relocation of its outfall, and installation of a primary treatment facility at Georgia-Pacific. Both facilities were activated after the change in designation went into effect. (13)

The primary sources of pollution as reported in 1972 were municipal sewage entering the Bay from South Bellingham and Whatcom Creek Waterway, sulfite waste liquor from the Georgia-Pacific Corporation pulp plant, wastes from several fish and food processing plants, and wastes from commercial and private boats. (14) The new primary sewage treatment facility was put into operation at Post Point in July, 1974. Wastes from the food processing plants (except Dahl Fish Company) and sanitary sources are now routed through that treatment plant. The average flow through the treatment plant during 1976 was approximately 5.5 million gallons per day.

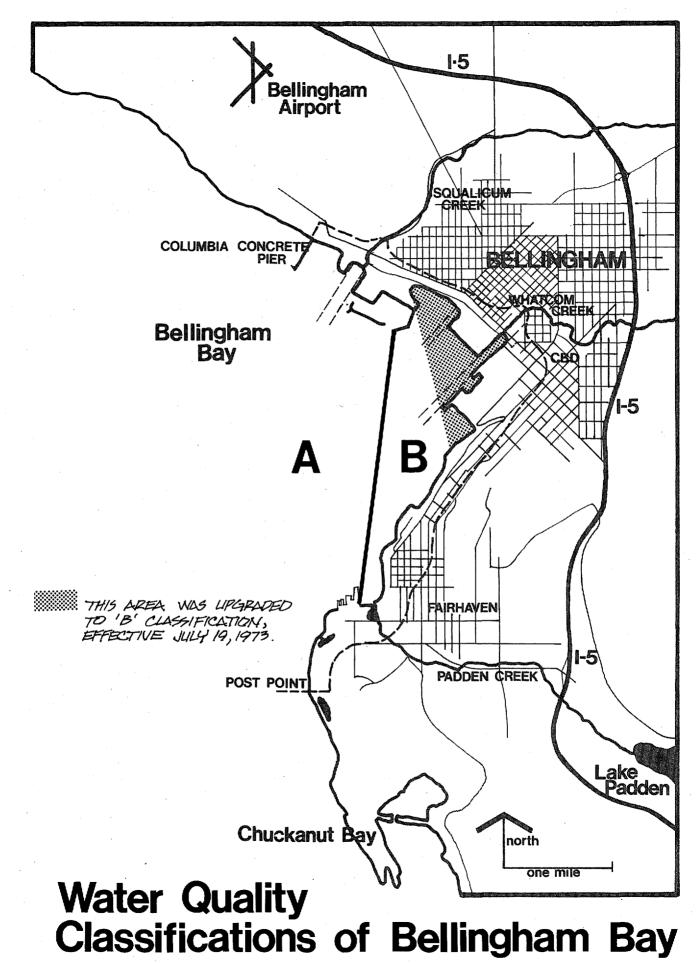
Of the above pollution sources, Georgia-Pacific Corporation is presently thought to have the most impact on Bellingham Bay waters. Their operations and facilities include pulp manufacturing, a caustic-chlorine plant, tissue and paper products, alcohol production, lignin production, salt storage area, marine log storage, chemical barge loading, lignin storage, woodchip and sawdust unloading, and numerous other shipping and storage activities. (8)

Sulfite waste liquor (SWL), a chemical used in Georgia-Pacific's pulping process is discharged into Whatcom Waterway and spreads out into the Bay from the point discharge. According to Webber, SWL is toxic to some marine organisms and also puts a biochemical oxygen demand (BOD) on receiving waters. (6)

Georgia-Pacific's discharges have been partially curtailed by several means including use of a clarifier, partial connection to the municipal wastewater treatment plant, and settling ponds for mercury-containing by-products. Harvey predicts that GP's impact on the quality of the Bay waters will continue into the future but that the impact will be substantially less than that experienced in past years. (8)

A large area between C Street and I and J Street Waterway was the garbage disposal site of the City of Bellingham until 1974. According to Webber, the site is surrounded by an impervious berm but the leachate water from the area has been drained by pipe through the berm and into the intertidal area. The City of Bellingham analyzed the leachate and it was found to be highly contaminated. The pipe was since closed but the disposition of the leachate that previously drained through the outlet is unknown. (6)

Contaminated and toxic dredging spoils from Whatcom Creek Waterway have been dumped into the bay in the log rafting area southwest of the Port North Terminal. These spoils contain large amounts of toxic materials accumulated by Georgia-Pacific's operations. In 1972, Washington State Department of Fisheries conducted a study of the water quality in the dredge dump areas. Data showed that the control areas used in the study were just as contaminated as the test dump sites, indicating that water quality problems in Bellingham Bay are widespread. (8)



(FROM PANDALL; PEFERENCE 2)

FIGURE 9

Coliform bacteria have been identified as a pollution problem by Webber. Although these organisms are common to the intestinal tract of man and animals, their presence in water is an indication of pollution. Webber identified the sources of coliform in Bellingham Bay as freshwater drainage systems and domestic waste outfall. The Nooksack River carries coliform bacteria into the bay and it is possible that Whatcom and Squalicum Creeks also contribute to the coliform loading. Webber reports that coliform bacteria still pose a problem in the area of the municipal treatment plant outfall at Post Point. The beach area surrounding the outfall showed consistently high coliform counts during the year as well. (6)

Combined (sanitary-storm) sewer overflows also contribute to the water quality conditions in Bellingham Bay. There are five such overflows in and near the study area: 1) Edgemoor area - Willow Road Pump Station just south of Post Point which discharges into lagoon, 2) Oak Street Pump Station (old sewage treatment plant outfall) which discharges into the bay, 3) foot of Bennet Street which discharges into bay, 4) Whatcom Creek at Humboldt Street (upstream of study area), and 5) Meridian Street Pump Station on Squalicum Creek. Those overflows at locations 1 and 4 discharge several times a year. Locations 2 and 5 very rarely, and location 3 discharge frequency is unknown. (15) Combined sewer overflows are generally high in coliform, suspended solids, and biochemical oxygen demand. A facility plan is being developed to control the overflow problem.

Webber noted turbidity as an additional water quality problem in the bay. He attributed this problem to sediment loading from the Nooksack River, industrial effluent from Georgia-Pacific, and phytoplankton production in late spring and summer. The highest levels were noted in Whatcom Waterway and near the Nooksack delta. (6)

Additional pollution sources include runoff from urban areas, construction sites, logging, and agricultural areas, chemical and fuel storage, log storage, dredging, and solid waste disposal sites. (1)

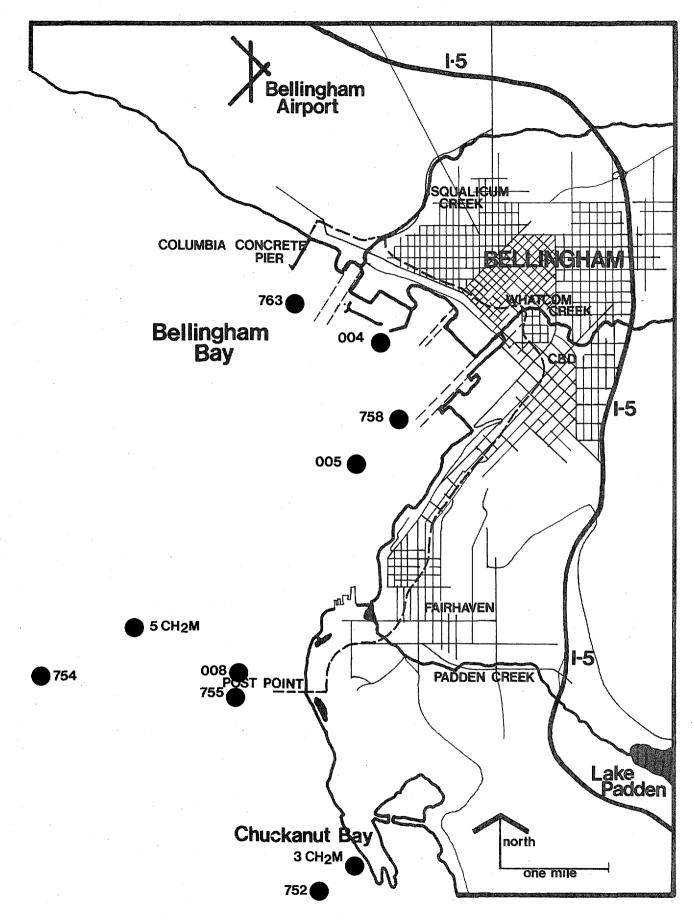
Bellingham Bay waters have been studied extensively quantitatively, but few comprehensive water-quality surveys have been made. According to a 1974 report by CH₂M Hill, most of the data collected through 1973 was on temperature, dissolved oxygen, salinity, and sulfite waste liquor

(SWL). Table 1 shows selected water quality data by comparison of five pairs of stations. The location of stations is shown on Figure 10. The pairs of stations selected were chosen on the basis of their location and the period when samples were taken. (1) Each pair of stations is 300-2500 yards apart, so conditions are expected to be similar between each pair of stations. The data shown represents an average of data collected 4-14 years apart in an effort to indicate water quality changes over time. Water quality trends derived from the data shown in the table are a slight rise in temperature, a slight drop in dissolved oxygen in some locations, and an increase in SWL through 1970. (1) Due to the sporadic nature of the data collected over the past years with respect to location of stations and parameters measured, general trends in water quality conditions are difficult to substantiate.

Webber's 1977 Literature Survey states that surface oxygen values for most of Bellingham Bay approach saturation values throughout the year (Collias and Barnes 1966; CH₂M, 1976) and at all times exceeded the 6.0 mg/l value for Class A waters. In inner Bellingham Bay where the concentration of SWL is high, 0₂ values in surface waters may be depressed (Collias and Barnes, 1966) and often are less than 6.0 mg/l limit for Class A waters. (6) SWL is known to contribute an oxygen demand to receiving waters.

Little data is available on water quality conditions beyond 1974, however, it is thought that no measurable changes have occurred in the bay waters since that time. (16) Some qualitative changes have been observed recently which indicate an improvement in water quality. Log rafts stored in the near shore water and pilings are now becoming infested with worms. In past years worms were not a problem, apparently due to poor water quality conditions which would not support them. Another indication of improved water quality is the siting of seals in near shore waters which were not observed in past years. (13,16)

The impact of water quality conditions on the use of the bay was evidenced in the past by warning signs posted by the County Health Department in shellfish areas. The hazardous conditions were a result of



Water Quality Sampling Stations

(FROM CH2MHILL; REFERENCE 1)

FIGURE 10

TABLE 1

SELECTED WATER QUALITY DATA, BELLINGHAM BAY
AVERAGE VALUES AND STANDARD DEVIATIONS (IN PARANTHESES)

Station*	Sampling Period	Temp. (°C)	D.O. (mg/1)	D.O. (% Sat.)	рН	Salinity (Parts per Thousand)	Ortho PO (mg/1) ⁴	SWL-PBI (mg/1)	Turbidity (JTU)	Total Coli. (#/100 m1)	Distance Between Stations	
763	Nov 59-May 63	11.0 (3.0)	8.4 (1.9)	89.0 (21.8)		25.6 (5.5)	0.007 (.002)	40.5 (46.4)	-	-	~1.25 Naut. Miles	
004	Aug 67-Sep 70	11.4 (4.6)	7.0 (2.1)		7.4 (0.44)	24.7	-	402.0 (850.8)	8.6 (5.8)	1,994.9 (2,695.7)		
754	Nov 59-Jun 63	10.0 (2.3)	8.3 (1.7)	88.6 (18.6)	7,8 (0.03)	28.4 (2.5)	0.0072 (0.0017)	18.6 (29.7)	- -	. -	~0.75 Naut. Miles	
CH5	Jan 73-Jun 73	8.5 (1.9)	9.5 (1.4)		7.1 (0.2)	27.9 (2.7)	0.07 (0.03)	14 (24)	-	3 (8)		
752	Nov 59-May 63	10.2 (2.2)	8.3 (1.7)	89.6 (19.9)		29.0 (1.1)	0.0074 (0.0015)	7.8 (12.1)	-	-		
СН3	Jan 73-Jun 73	8.5 (1.7)	9.6 (1.8)	-	7.1 (0.2)	28.6 (0.5)	0.06 (0.02)	5 (7)	-	1 (3)	~0.25 Naut. Miles	
755	Nov 59-Jul 63	10.6 (2.5)	8.4 (1.9)	90.5 (23.8)	8.0 (0.18)	28.8 (1.9)	0.0075 (0.0017)	15.4 (23.3)	 -	_		
008	Aug 67-Sep 70	11.7 (4.2)	8.3 (1.3)	<u>-</u>	7.8 (0.27)	27.9 (3.8)	-	35.4 (39.1)	3.2 (1.5)	-	~300 Yards	
758	Nov 59-Apr 63	10.4 (3.0)	0.1 (1.95)	85.5 (22.5)	-	26.5 (4.8)	0.0069 (0.0025)	72.1 (93.7)	 -	_		
005	Aug 67-Sep 70	11.8 (4.6)	7.7 (1.5)		7.6 (0.31)	26.3 (5.1)	<u>-</u>	102.1 (112.4)	4.8 (2.98)	482.3 (898.8)	~0.75 Naut. Miles	

^{*} For location of stations, see Figure 10

SWL-PBI = Sulfite Waste Liquor -Pearl Benson Index

(From CH₂M Hill, Ref. 1)

elevated bacterial concentrations in the shellfish which were derived from the aggregate waste discharge. (14) At present, the only restrictions on the harvest of fish and shellfish are located near Chuckanut Village due to red tide residual and near the municipal treatment plant discharge. There are currently no restrictions due to industrial activity. (17)

3.2 Streams

There are three streams which empty into Bellingham Bay within the boundaries of the study area. All three are designated as Class A by the Department of Ecology. Northern-most of the three is Squalicum Creek. The course of this stream was altered in the past and the channel stabilized to accommodate the construction of Squalium Way. The existing mouth empties into what is now known as Squalicum Creek Waterway. (18) There are no regular state or federal water quality sampling stations on Squalicum Creek. (1)

Whatcom Creek passes through the downtown area of Bellingham and enters Bellingham Bay through the Whatcom Creek Waterway. It is surrounded by manmade modifications near its mouth and the banks of the creek are not maintained. (18) A limited number of analyses have been done by DOE on Whatcom Creek. The interpretation of data by CH₂M-Hill indicates that the creek is slightly more polluted at the mouth as compared with upstream sections in terms of higher color, turbidity, conductivity, nutrients, and coliform bacteria. Dissolved oxygen, however is higher at the mouth, mainly due to several waterfalls which aerate the water. (1)

Padden Creek enters Bellingham Bay through a mudflat near Harris Avenue and 9th Street. This creek serves as the outlet for Lake Padden. The natural characteristics of the Creek have been significantly altered by manmade structures. (18) There are no regular federal or state sampling stations along the creek.

3.3 Lakes

Portions of Lake Whatcom and Lake Padden lie in Bellingham and are associated with the respective creeks. Lake Whatcom, the larger of the two lakes has been studied from a water quality standpoint and chemical

and physical data have been interpreted by CH₂M-Hill as showing a very high quality, with typical seasonal changes. There has been a correlation between coliform measurements and precipitation, supporting the explanation that surface runoff or drainage after storms may contain high levels of coliform. The source of coliform may be from overflow of septic tanks in the more developed areas around the lake. (1)

The City of Bellingham owns all the land around Lake Padden and has developed many recreational activities. Until December of 1968, Lake Padden was the water supply for the City of Bellingham. (18) For this reason, water quality conditions are expected to be quite high. Both lakes are designated as Class AA (extraordinary) by the Department of Ecology.

For detailed water quality information on the marine and fresh waters of the study area, refer to the 1974 report by $\text{CH}_{2}^{\text{M}-\text{Hill.}}^{(1)}$

4. AIR QUALITY AND NOISE

4.1 Air Contaminant Sources

The Northwest Air Pollution Authority (NWAPA) has estimated that in Whatcom County the distribution of air pollutant emissions by manmade sources is as follows: 65% industry, 19% transportation, 3% fuel combustion, 4% solid waste and 9% miscellaneous sources. (19) As industry in Whatcom County is concentrated mainly in Bellingham and Ferndale, it appears safe to assume that industry's contribution to air pollutant emissions in those cities is greater than in the county as a whole.

The major potential air pollutant-emitting activities in the study area are given in Table 2.

As defined by NWAPA Regulations, a Class "A" source is one which generally emits more than fifty tons of pollutants per year or whose emissions are of significant impact. The 1975 Class "A" source emission inventory by NWAPA is the most current. (20) The Bellingham sources listed are Columbia Cement Company, Georgia-Pacific Corporation, Mt. Baker Plywood Company, and Olivine Corporation. Columbia Cement is not within the study area but it nevertheless has an impact on the study area air quality and will therefore be discussed here. Table 3 presents each of the above industry's air pollutant emissions (tons/year) for 1975 and the changes

TABLE 2

POTENTIAL AIR POLLUTANT SOURCES IN STUDY AREA

Activity or Source Air Pollutants Generated Transportation HC, Part, NO, SO, CO, Ald, O.A., Odor HC, Part, NO, SO, CO, Ald, Odor HC, Part, NO, SO, CO, Ald, O.A., Odor HC, Part, NO, SO, CO HC, Part, NO, SO, CO Railroad Ships Trucks (Diesel) Automobiles (Gasoline) Aircraft Transportation Activity on Unpaved Roads Part Sand and Gravel Processing Part Rock Crushing Part Concrete Batching Part Part, NO_x, SO_x Portland Cement Manufacturing Pulp and Paper Production Part, SO_x , CO, Hydrogen Sulfide (Odor) Wood Waste Combustion HC, Part, NO, SO, CO Incineration (other than wood) HC, Part, NO, SO, CO, Odor Chlorine and Alkali Production CO, Hg, Cl, Veneer Drying HC, Part Petroleum Storage HC Sulfuric Acid Production SO, Acid Mist Fish Processing Odor Manufacturing with Fiberglass Part, Odor Sewage Treatment Odor

Fluorine

Mercury

Chlorine

Organic Acids

Aldehydes

Ald

C1₂

0.A. =

HC

Part

 so_{x}

CO

Hydrocarbons

Particulates

Sulfur Oxides

Nitrogen Oxides

Carbon Monoxide

TABLE 3

1975 CLASS "A" SOURCE EMISSIONS
(Tons/Year) (20)

Numbers in parentheses indicate changes in emissions since the previous calendar year.

	HC	Part	NO _X	SO _x	CO	Ald	C1 ₂	Hg
Columbia Cement		190 (+10)	420 (+10)	1240 (+270)				
Georgia- Pacific	75 (+25)	900 (+140)	530 (+15)	700 (+160)	100 (+20)	4 (+1)	0.5 (+0.2)	0.2 (-0.8)
Mt. Baker Plywood	13 (- 13)	150 (-160)	60 (- 60)		10 (-11)			
Olivine		20 (0)			time days.			
TOTALS	88 (+12)	1260 (-10)	1010 (-35)	1940 (+430)	110 (+9)	4 (+1)	0.5 (+0.2)	0.2 (-0.8)

TABLE 4

1975 CLASS "A" SOURCE EMISSIONS AS

PERCENTAGES OF TOTAL BELLINGHAM CLASS "A" EMISSIONS

	HC	Part	NO _x	SO _x	CO	A1d	Cl ₂	Hg
Columbia Cement		15	42	64		, 		
Georgia- Pacific	85	71	52	36	91	100	100	100
Mt. Baker Plywood	15	12	6		9			
Olivine		2						-
TOTALS	100	100	100	100	100	100	100	100

those emissions represent in relation to the 1974 totals. Table 4 presents the 1975 emissions as percentages of the Class "A" totals for Bellingham.

The Class "A" industries in Bellingham are briefly discussed below:

o COLUMBIA CEMENT

Portland cement manufacturing. Particulates from barge loading activities are negligible. Changes in emissions resulted from different quantities of fuels burned and an increase in total production. (20)

o GEORGIA-PACIFIC

Pulp and paper, chlor-alkali and sulfuric acid production. Changes in emissions were due to increased oil and hog fuel usage, decreased natural gas burning and the addition of a mercury scrubber on the chlor-alkali plant. (20) The boiler plant is currently operating under a variance from visual, particulate emission and ambient sulfur dioxide standards.

o MT. BAKER PLYWOOD

Plywood manufacturing. Changes in emissions resulted from fewer hours of plant operation and less hog fuel burned. (20) The veneer dryers are currently operated under a variance from visual and particulate emission standards.

o OLIVINE

Olivine crushing and processing. Particulate emissions are a result of the crushing operations and open storage of piles of olivine "flour".

4.2 Ambient Air Quality

Present ambient air quality in the study area is a factor of the strength and quality of the emissions from all of the sources in Table 2 and meteorological and topological conditions.

The Northwest Air Pollution Authority has several suspended particulate and sulfur dioxide monitoring stations in Bellingham. They also audit a suspended particulate and sulfur dioxide monitoring station operated by Georgia-Pacific on its site. Until recently the Department of Ecology monitored the levels of various air pollutants at the intersection of Farragut and G Streets. They also audit an ambient sulfur dioxide and suspended particulate monitoring station operated by Georgia-Pacific on its site.

Based on data collected from the above monitoring stations, Bellingham appears to meet the NWAPA ambient air quality standards for nitrogen oxides, carbon monoxide, fluorine, photochemical oxidants, hydrocarbons and hazardous air pollutants. (8) However, the suspended particulate standard for annual geometric mean (60 $\mu \text{g/m}^3$) is frequently exceeded in the vicinities of Georgia-Pacific and Columbia Cement. The daily average suspended particulate concentration near the Columbia Cement plant is also often in excess of the NWAPA standard (150 $\mu \text{g/m}^3$). The five minute (0.8 parts per million by volume) and hourly (0.4 parts per million) standards for sulfur dioxide are frequently exceeded in the area of Georgia-Pacific. $^{(21)}$

Localized odor problems are associated with the Post Point Sewage Treatment Plant, various fish processing plants, Uniflite fiberglass operations and certain mudflats. Odor from Georgia-Pacific operations affects a large portion of Bellingham.

4.3 Noise

The City of Bellingham does not have a noise control ordinance at this time. Therefore, although it is known that there are localized areas of high noise levels due to industry and transportation, there exists a lack of definitive noise level data for the study area.

5. TOPOGRAPHY AND SOILS

5.1 Topography

Regionally, the Bellingham area has tremendous topographic variation. The dramatic landforms cut by the last glaciation are clearly an important visual asset. Within the CZM study area there are steep cliffs (30%+) rising directly from the shoreline. These cliffs parallel the waterfront with the exceptions of the Fairhaven and Central Business District areas where large swales allow for easy access to the shoreline.

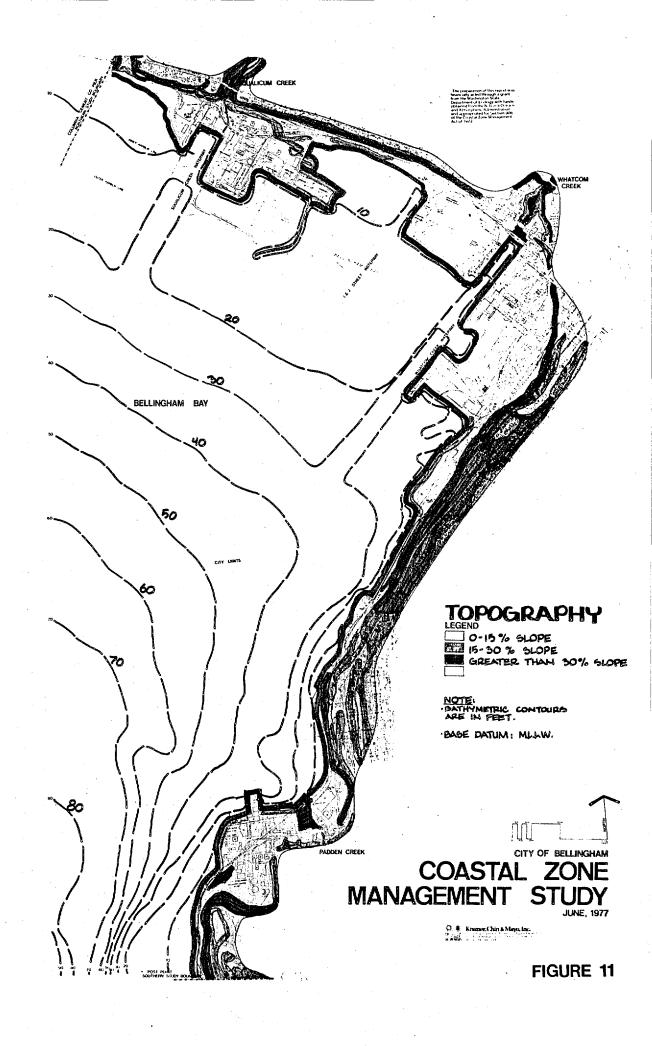
These cliffs are buildable but only with major excavative, foundation and revegetative efforts. The soils associated with these steep cliffs are stable as long as the existing vegetation is not removed. The remaining areas within the study area are of moderate slope and will accommodate increased development. Topography within the study area is shown on Figure 11; the steep cliffs are shown as constraints on future development in Figure 19.

5.2 Soils

The soils found within the CZM study area (Figure 12) are generally good buildable soils. All soil types, except for the Mukilteo peats, can be developed beyond their current use. The only restriction is where the slope/soil relationship becomes erodable when existing vegetation is removed. This occurs on all slopes bordering on Bellingham Bay which are greater than 20%. (22)

The most significant aspect of the soil types within the study area is the abundance of the manmade classification. Seven miles, from Post Point to Mt. Baker Plywood, is under this classification (Ma). The quality of these soils vary depending upon the age of the fill area, past and current uses and the material underlying these areas.

The following is a short description of the characteristics of the various soil types found within the CZM study area. (22)



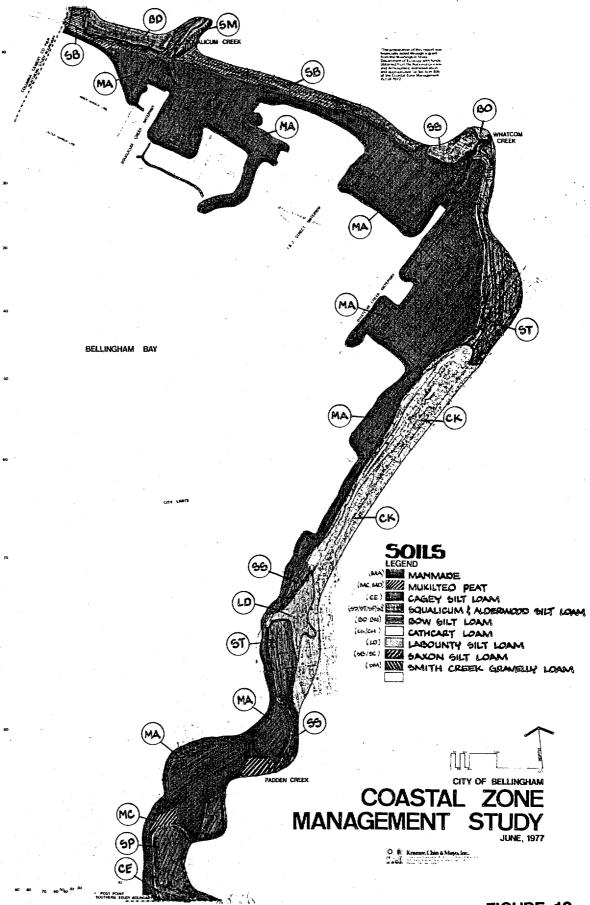


FIGURE 12

- Bn Bow Silt Loam, Undulating: Parent material:
- Bo Glacial lake and Marine-Delta deposits; dominant slope: 3-12%; internal drainage; slow; (shear strength/shrink-swell/bearing capacity, information yet to be gathered).
- Ce Cagey Silt Loam: Undulating: Parent material:
 gravel manteled tight clay till; dominant slope: 3-6%; internal
 drainage: moderately slow; shear strength: high; shrink-swell
 potential: moderate; Bearing Capacity: high.
- Ch Cathcart Loam: Parent material: sandstone; Dominant slope:
- Ck Ch (15-30%), Ck (6-15%); internal drainage: moderate; shear strength: high; shrink/swell potential: low; Bearing Capacity: high, bedrock.
- Ma Manmade: The abundance of this cateogry is shared by the abundance of materials used as fill. The bearing capacity of these soils is generally low. The variability of these soils must be determined on a site by site basis. Dominant slope is 0-3%.
- Mc Mukilteo Peat: Parent material: sedge accumulation; Dominant slope: 0-3%; internal drainage: very slow; shrink/swell potential: high; bearing capacity: very low.
- Ld LaBounty Silt Loam: Undulating: Parent material: tight clay till;

 Dominant Slope: 3-6%; internal drainage: slow; shear strength:

 Low; shrink/swell potential: high; bearing capacity: moderate-low.
- Mb McKenna Silty Clay Loam: Parent material: tight clay till; dominant slope: 1-4%; internal drainage: slow; shear strength: very low; shrink/swell potential: high; bearing capacity: very low.

- Sb Saxon Silt Loam: Parent material: Glacial Lake sediments; Dominant slope: Sb (15-30%), Sc (3-8%); internal drainage: moderate; (shear strength, shrink/swell potential and bearing capacity information yet to be gathered).
- Sm Smith Creek gravelly Loam: Parent material: mixed gravelly materials; Dominant slope: 15-30%; internal drainage: rapid; (shear strength, shrink/swell potential and bearing capacity information yet to be gathered).
- So Squalicum and Alderwood Silt Loams: Parent material: Sandy Clay till;
- Sp Dominant slope: So, SS (15-30%); Sp, St (6-15%); internal drainage:
- SS moderate; shear strength: moderate; shrink/swell potential: moderate;
- St Bearing capacity: moderate to low.
- Wb Whatcom Silt Loam: hilly: Parent Material: tight clay till:

 Dominant Slope; 15-30%; internal drainage: slow; shear strength:

 very low; shrink/swell potential: high; bearing capacity: moderate-low.

6. FLORA AND FAUNA OF BELLINGHAM BAY

The physical characteristics of Bellingham Bay provide a variety of habitats and a rich diversity of organisms. The estuary at the north end of the bay formed by the Nooksack River is a particularly fertile area since organic detritus transported by the river accumulates there. The highest concentration of biota in the bay probably occurs in this area. The portion of Bellingham Bay within the study area is strongly influenced by the physical changes which have occured along the shoreline and by the higher concentration of water contaminants as compared to outer Bellingham Bay waters. Webber has found that this area of the bay has a low diversity and density of organisms. (6) It is expected that some species have been eliminated from the immediate area due to decreased water quality, changes in the physical characteristics of the shoreline, and relocation of timid species which are intolerant of the noise and activities from man's presence.

There is no known comprehensive study which provides information on all major organisms in the bay and their exact locations. For this reason, most of the flora and fauna will be described as they occur in association with their respective habitats.

6.1 Shoreline

Compared with other Puget Sound areas, the diversity and density of intertidal invertebrates in Bellingham Bay is relatively low. (6)

Reduction in surface salinity by freshwater drainage and industrial activities in the bay are stresses to many intertidal organisms. Webber reported that the cobble beach areas of Post Point receive limited salinity stress and are moderately rich intertidal communities, but that beaches northward from Post Point are stressed by industrial activity as well as fresh water drainage so diversity and density is low in that area. (6)

Webber has found that the beaches within the city limits of Bellingham have low densities of shellfish. He predicts a possible increase in certain species should water quality improve and log booming activities cease. (6)

The flora and fauna of the shoreline zone is described in relation to the habitats which occur in the study area (refer to Figure 13). A brief description of each habitat and where it occurs in the study area will be included here. The organisms associated with the habitat as they have historically occurred in the Puget Sound region are listed in Appendix A. (18)

6.1.1 Marine Mudflat Community

There are two mudflats within the study area. One is located northeast of the Squalicum Boat Harbor. This area was formerly the delta of Squalicum Creek before the creek was relocated. The other is at the mouth of Padden Creek. The Squalicum Creek mudflats have virtually no attached

vegetation, while the Padden Creek flats support scattered eelgrass colonies and a few types of algal beds. (18) The high organic content of the flats supports an ecosystem of decomposers (polychaetes), filter feeders (mollusks) and scavengers (arthropods). These organisms are preyed upon by birds and mammals. Despite the bulkheading around the mudflats and effluent from nearby industries, the mudflats are in fairly sound condition. (18)

6.1.2 Marine Tidal Marsh Community

Only one tidal marsh exists within the study area. It is located on the east side of the Squalicum Creek mudflat. This tidal marsh consists of emergent vegetation as found at the edges of mudflats, backshore lagoons and freshwater deltas. (18) Animal species in this biotic community approximate those found in the mudflat community. However, the number of marine organisms is fewer due to the stress of higher water temperatures and longer periods of dessication. To balance this lower number of marine organisms, a considerable amount of cover and nesting area is provided by the emergent vegetation, which supports an abundance of terrestrial bird and mammal life. (18)

6.1.3 Marine Sand-Cobble Beach Community

The sand-cobble beach communities in the study area are located from Post Point north along the shore to approximately Beach Street, and along the southeast breakwater of the boat basin. The rockier areas of this community support attached algae while areas in which fine sediments are found provide habitat for eelgrass. A large variety of marine invertebrates is found in this intertidal community; and during low tide, many birds and mammals feed on these organisms. (18)

6.1.4 Lake, Pond, or Reservoir Community

This community type is represented in the study area by the sewage lagoon located at the Bellingham Municipal Treatment Plant at Post Point. Although artificially created, a lagoon offers some features

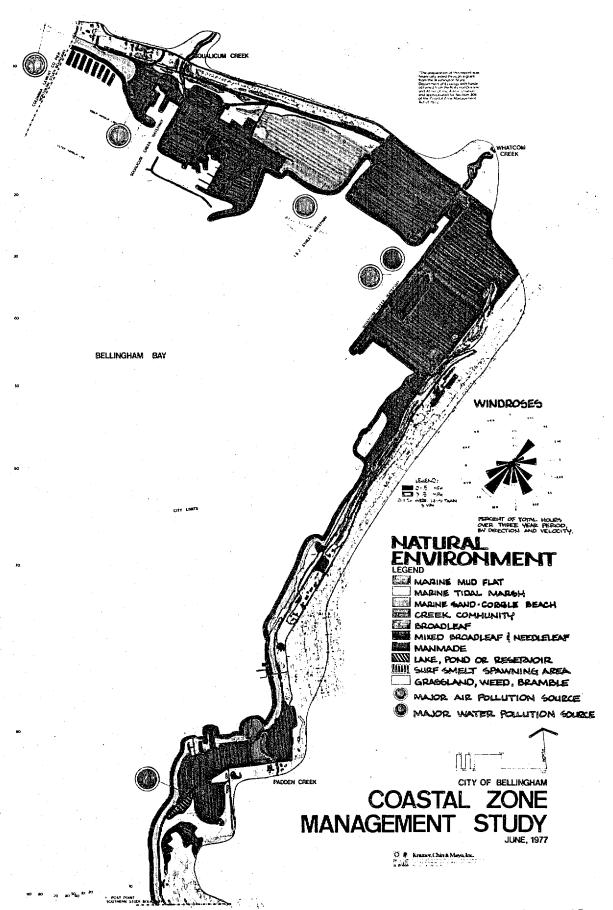


FIGURE 13

found in a natural pond. The impounded water creates a habitat for aquatic birds, algae, macrophytes, and insects, however other freshwater forms such fish and crustaceans would be absent. Gulls are frequent visitors at sewage lagoons since they are primarily scavengers. The list of flora and fauna given in Appendix A for lake, pond, or reservoir community includes species associated with a natural body of standing water. Therefore, the species actually occuring in the study area would include only a limited number of those listed.

6.1.5 Creek Community

There are short stretches of three creeks within the study area: Whatcom, Squalicum and Padden Creeks. Whatcom Creek flows through the core of the City of Bellingham and empties into Bellingham Bay at the Whatcom Waterway. The banks of the creek range in height from 8 to 20 plus feet and bulkheading occurs in various places to accommodate roadway overpasses or to shore up buildings located near the bank. West of Dupont Street, the Creek is a small tidally affected estuary. Squalicum Creek goes through the northern part of the City of Bellingham and enters the bay at the Squalicum Creek Waterway. Prior to 1962, the Creek entered the bay to the south of its present mouth and formed a large mudflat. In 1962, the stream was diverted and now flows under Roeder Avenue and a railroad bridge prior to its termination. Channeling is aided by concrete bulkheads. Padden Creek drains Lake Padden and empties into the bay on the northwest side of the South Terminal (Port of Bellingham land fill). At its terminus, the creek has formed a small mudflat which is bordered by bulkheads for land fill areas. (18)

Although there are only short stretches of each creek encompassed by the study area, they do provide habitat for a large number of plant and animal life. The submergent vegetation of the creeks consists of algae and other higher plants such as waterweed. Emergent vegetation consists of many species of mosses and higher plants. The creek also provides habitat for amphibians, fishes, mammals, birds and invertebrates. (18)

Salmon runs have been documented in each of the three creeks. Squalicum Creek has a considerable area of good quality pool-riffle conditions. The bottom is predominantly gravel and rubble, with approximately 9 river miles of rearing area. There have been good numbers of adult coho with some utilization by pink and chum in the past; however, it is doubtful that chum have been present in recent years. (23,24) On a survey of lower Squalicum Creek on November 30, 1976, two coho and two steelhead were observed. There were 75,000 coho fry planted in upper Squalicum Creek in spring of 1977. (24)

Salmon use in Whatcom Creek was shown to include chinook, coho, and chum in a 1975 report. (23) More recent information shows use by coho and steelhead, but probably not chum. (24) Most of the lower reach is fast riffle with a few pools, and the bottom is mainly rubble and gravel with some boulder stretches. (23) There are 2.3 miles available for spawning and rearing. In the spring of 1977, steelhead and 6000 coho fry were planted in Whatcom Creek. The steelhead used for planting were raised at the hatchery on Whatcom Creek just below Lake Whatcom. This hatchery has in the past raised steelhead, cutthroat, and rainbow trout for planting in other areas. This year is the first time that the fish from that hatchery have been released in Whatcom Creek. (24)

Little is known regarding present salmon use in Padden Creek, but reports indicate it has had runs of coho and chum. (23) Two years ago there were coho fry observed there, but no counts are available. Fish have access to 1.8 miles of the creek. (24)

6.1.6 Broadleaf Forest Community

The broadleaf forest community is located through the study area, predominantly on the slope between the railroad and the residential areas at the top of the bluffs to the north and south of the core of the City. This community represents the first stage of forest succession that usually follows grassland development or disturbances in other communities. Vegetation in this community may be divided into two catagories; upper canopy, such as birch and maple trees and, understory, such as vine maple and ferns. The broadleaf forest provides habitat for many species of mammals, birds, amphibians, reptiles and innumerable invertebrates. (18)

6.1.7 Grassland, Weed, Bramble Community

This community is found throughout the study area along the railroad right-of-way, creeks, on land fills and intermixed with the broadleaf forest previously discussed. The dominant vegetation consists of grasses, flowers and weeds and brambles. This community provides habitat for many reptiles, mammals and birds; however, some niches may not be occupied due to the proximity of urban and industrial areas. (18)

6.1.8 Mixed Broadleaf-Needleleaf Forest Community

Within the study area there is a small mixed community located east of the Bellingham sewage treatment facility. This community represents a further stage in the succession of broadleaf to needleleaf communities. Dominant upper canopy tree species are of the needleleaf group such as Douglas fir. The organisms found here include a composite group which includes species found in broadleaf and needleleaf communities. (18)

6.1.9 Man-Made Areas

Man-made areas dominate the shoreline of the study area. There are landfills at the north and south Port of Bellingham terminals and Georgia-Pacific, a land fill north of Whatcom Creek Waterway; and a land fill for facilities at Squalicum Boat Harbor. There is also a man-made breakwater at the boat haven, rip-rap bulkhead spanning the Squalicum mud flats, and piers and pilings for log storage. These man-made areas have eliminated natural environments for some organisms while providing different types of environments for other organisms.

Man-made areas may encompass more than one community. A land fill with open areas will support a grass-weed bramble community on the surface and sand-cobble community at the water's edge. Likewise, the breakwater displaces subtidal organisms while providing niches for intertidal organisms. Pilings and piers also provide habitat for intertidal and some subtidal organisms that would otherwise not be present or not as abundant. The flora and fauna found in man-made areas would be a composite of various species found in the natural communities.

6.2 Benthic Organisms

Bellingham Bay supports a rich variety of benthic organisms.

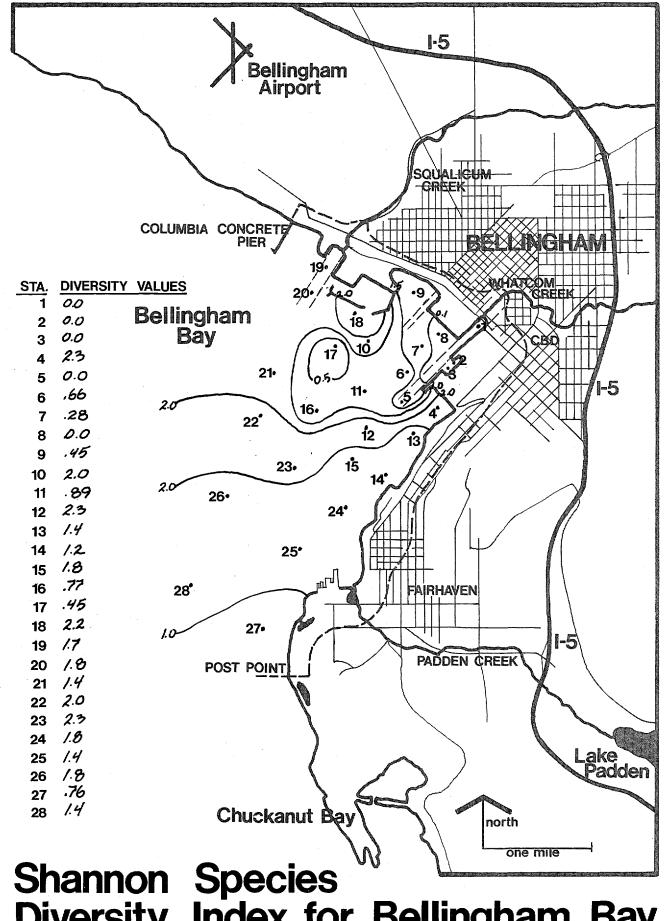
According to Webber, the water quality near the bottom is good, and only bottom sediments in the inner harbor are stressed from industrial activity. (6)

The benthic fauna is an integral part of the food web of the marine community. Bottom fish feed heavily on benthos, and these fish and some of the larger benthic animals are food for larger carnivores. All types of benthic surfaces are inhabited, from soft muds to firm rock and gravel, with each surface-type having its characteristic community composed of those forms best adopted to the particular substratum. (25) A species list of benthic organisms in Bellingham Bay is included in Appendix A.

Nelson (1974) studied extensively the distribution of benthic invertebrates in the sediments of inner Bellingham Bay, particularly to determine the possible effect of mercury on the diversity of organisms. Figure 14 shows the benthic species diversity indices for inner Bellingham Bay as determined by Nelson. A species diversity index expresses the relationship between the number of species present and the total number of organisms. Any strong limiting factor, whether biological, physical, or chemical, can reduce or eliminate sensitive species. Environmental fitness can be inferred from the diversity index, with a low diversity suggestive of poor environmental quality. The sites with zero diversity (no species or one species present) are located in and around Whatcom Waterway. This area receives much industrial waste, mainly from Georgia-Pacific Corporation Pulp and Paper Mill. High concentrations of sulfite waste liquor (SWL) are also frequent in the waterway. (11) Other sampling stations in inner Bellingham Bay beyond the end of Whatcom Waterway indicated good diversity.

Nelson found that the species diversity had a very poor correlation with mercury content of the sediment and thus mercury is not thought to be a limiting factor to the organisms. (11)

In contrast, Webber found that the benthic fish are distributed fairly evenly over the bay, even in the Whatcom Creek Waterway. (6)



Diversity Index for Bellingham Bay

6.3 Open Waters of Bellingham Bay

The open waters of Bellingham Bay serve as the migration route for anadromous fish including Chinook, Coho, Pink, Chum, and Sockeye Salmon. (24) The occurrence of juvenile salmon in Bellingham Bay was studies in April, May, and June of 1964. The results indicated some avoidance by young salmon of the more polluted areas and/or some mortality and disappearance of juveniles which entered such areas. The lowest concentration of young fish in the area studied was found to be in Whatcom Waterway near Georgia-Pacific's waste discharge. (25) In addition to salmon, the bay also provides habitat for herring, trout, steelhead, and bottomfish. (14,6) Included in Appendix A is a species list of nearshore and benthic fish caught in Bellingham Bay.

Bellingham Bay lies in the pathway of the north-south migratory flyway western birds, and so has attracted several species as a stopover on their migration flights. Webber reports that fifty species of marine birds utilize Bellingham Bay as a wintering ground.

In addition to the islands in and around the bay. The Nooksack River delta, Squalicum Creek, and the Post Point and Edgemoor lagoons provide excellent bird habitats. (6)

Bird species composition of the bay fluctuates monthly. Webber reports the western grebe as the most common, often flocking in groups of over 3,000 individuals. (6) A species list is contained in Appendix A.

The open waters of the bay provide habitat for a variety of marine mammals. Although there are no documented sitings available, the following species are expected to occur: killer whale, harbor porpoise, minke whale, harbor seal, and sea lion. The extent of their occurrence is not known. (26)

Major eelgrass beds are mapped in a portion of the west side of Bellingham Bay. (27) However, in the study area Post Point is the only place where it grows extensively. (6)

In addition to the larger forms of life in Bellingham Bay, the waters support numerous phytoplankton and zooplankton. Phytoplankton blooms have been observed in late spring and early fall. Webber has shown that there is a rich distribution of zooplankton distributed beneath the surface layers of fresh water and sulphite waste liquor. Apparently the low salinity and sulphite waste liquor on the surface exert a stress on the zooplankton organisms. (6)

Commercially important species include salmonids, dungeness crab, herring, smelt, bottom fish, and shellfish such as butter clams and little-neck clams. Bellingham Bay is also widely used for sport fishing of salmon and crab. (6)

CHAPTER 6

LAND USE CONSIDERATIONS

1. EXISTING ZONING AND SHORELINE DESIGNATIONS

1.1 Zoning

As shown on Figure 15, land within the study area is zoned as follows:

Post Point Area -- Residential Low Density (RL-1)

South Terminal Area -- Heavy Manufacturing (HM)

Boulevard Park Area -- Primarily Residential Medium

Density (RM) with a limited amount of Light Manufacturing (LM) near the Bayview Drive

Loop

North Terminal/Georgia-Pacific

Area -- Heavy Manufacturing (HM)

Whatcom Fill Area -- Heavy Manufacturing (HM)

Squalicum Marina Area -- Heavy Manufacturing (HM)

Bellingham Cold Storage Area -- Heavy Manufacturing (HM)

Definitions, permitted uses and other restrictions on development within each zone may be found in the City's Zoning Code.

1.2 Shoreline Designations

As can also be seen on Figure 15, the following are the shoreline environment designations within the study area as presented in the City's Shoreline Management Master Program. Definitions, permitted uses and restrictions on development within the various zones may be found in the City's Master Program. (29)

1.2.1 Bellingham Bay

Chuckanut Bay northerly of the Burlington Northern Railroad between the ordinary high water mark and the line of extreme low tide, together with the saltwater marsh northeasterly of the bay and the estuary of Chuckanut Creek----NATURAL.

From the south City limits to the north section line of Section 14, Township 37 North, Range 2 East, except the above natural designation --- CONSERVANCY I.

From the north section line of Section 14, Township 37 North, Range 2 East northerly to the south right-of-way line of Willow Road extended --- URBAN I.

From the south right-of-way line of Willow Road extended northerly around the Edgemoor Lagoon to the extended north line of Lot 7, Block 3, Edgemoor Division No. 2----CONSERVANCY I.

From the extended north line of Lot 7, Block 3, Edgemoor Division No. 2 northerly to the southerly line of Cowgill Avenue extended westerly----URBAN I.

From the southerly line of Cowgill Avenue extended westerly, northerly to the southerly line of Port Bellingham Marine Park----CONSERVANCY II.

From the southerly line of Port of Bellingham Marine Park to a line 120 feet west of the westerly right-of-way of 6 Street----URBAN II.

From a line 120 feet west of the westerly right-of-way line of 6th Street around to mudflats at the mouth of Padden Creek to the eastern end of the Burlington Northern Railroad trestle which crosses near the mouth of Padden Creek----CONSERVANCY II.

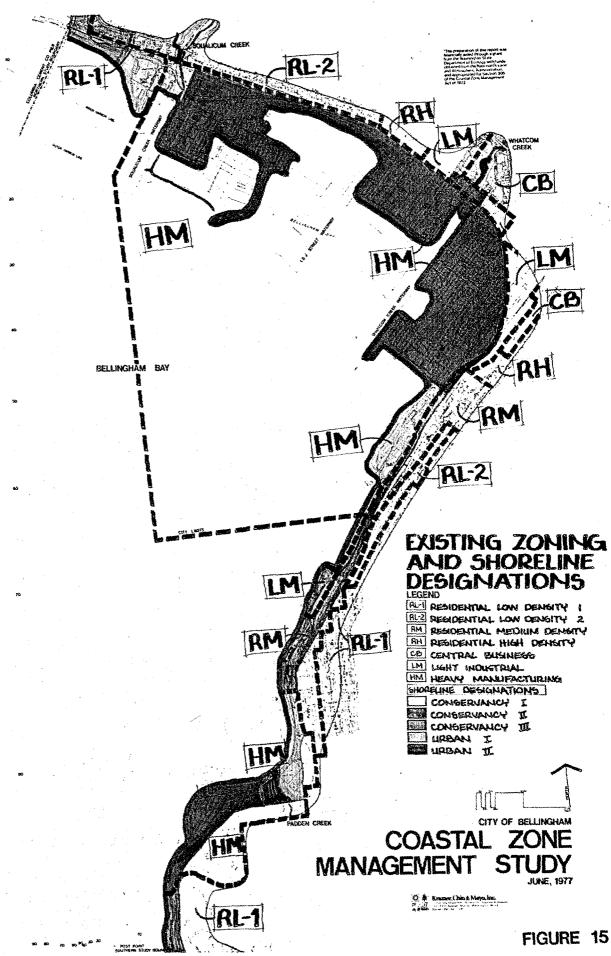
From the eastern end of the above described railroad trestle northerly to the south right-of-way line of Bennett Avenue extended----URBAN I.

From the extended northeasterly line of Lot 35 of E.K. Woods Industrial sites northeasterly to the north right-of-way line of vacated Darwin Avenue-----CONSERVANCY II.

From the north right-of-way line of vacated Darwin Avenue to the extended south line of Lot 1, Block 115, Bellingham Bay Land Company's Second Addition to Bellingham----CONSERVANCY III.

From the extended south line of Lot 1, Block 115, Bellingham Bay Land Company's Second Addition to Bellingham northeasterly to Roeder Avenue thence northwesterly to the north City limits----URBAN II.

From the easterly section line of Section 13, Township 37 North, Range 2 East westerly to the Chuckanut Creek estuary----CONSERVANCY II.



1.2.2 Padden Creek

From the exit of the creek from a culvert beneath Valley Parkway located approximately due south of the right-of-way of 17th Street westerly and northwesterly to Harris Avenue----CONSERVANCY II.

1.2.3 Whatcom Creek

From the easterly right-of-way line of SR5 to Roeder Avenue ---- URBAN I.

1.2.4 Squalicum Creek

From Roeder Avenue to Meridian Street----CONSERVANCY I.

1.2.5 County

The northern portion of the study area lies outside the City limits in Whatcom County. The Mt. Baker Plywood Company area is designated as Urban, and the gravel beach to the west is designated as Conservancy in the County's Shoreline Master Program. (30)

2. SHORELINE OWNERSHIP

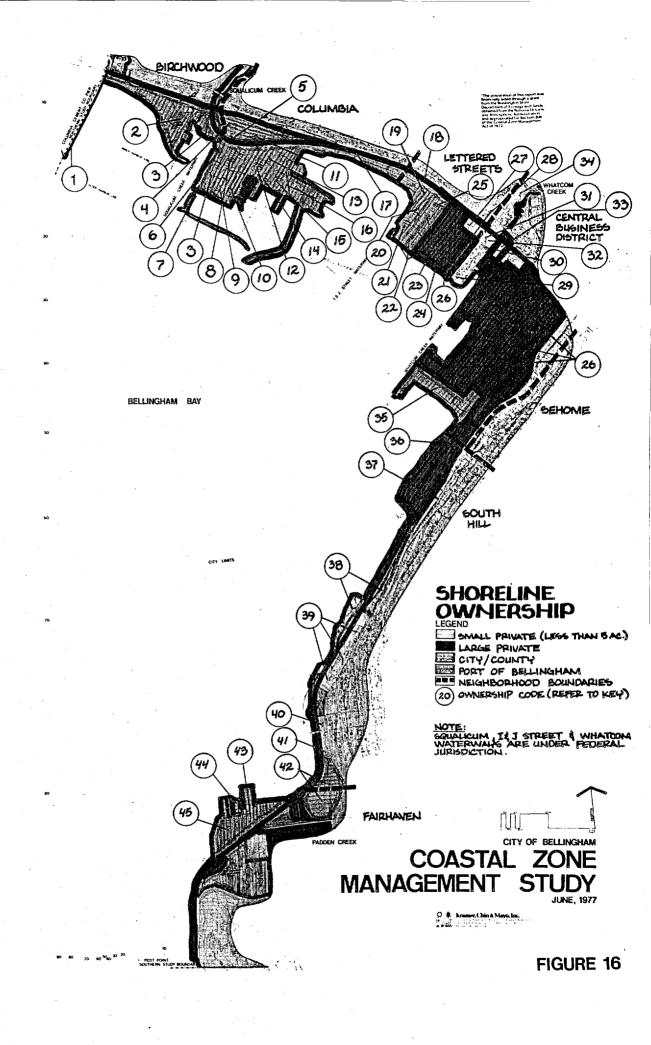
The City's shoreline inventory, which is part of the City's State Shoreline Master Program, subdivides ownership into five classifications:

Small private (less than 5 acres)
Large private
City/County
Port of Bellingham
Federal

The existing ownership patterns are shown on Figure 16 and are discussed in the following paragraphs.

KEY TO SHORELINE OWNERSHIP MAP (FIGURE 16)

Number	Ownership					
1	COLUMBIA CEMENT					
2	MT. BAKER PLYWOOD					
3	BELLINGHAM COLD STORAGE					
4	NORTHWEST FUEL					
5	YORKSTON OIL					
6	PACIFIC PEARL SEAFOODS					
7	SAN JUAN SEAFOODS					
8	BELLINGHAM FROZEN FOODS					
9	VITA FOODS					
10	BUMBLE BEE SEAFOODS					
11	NORTHERN ENGINE					
12	WELDCRAFT STEEL AND MARINE					
13	REDDEN NET					
14	PRIVATE YACHT CLUBS					
15	PORT COMMERICAL BUILDINGS (LEASED)					
16	PORT WEB HOUSES (LEASED)					
17	BURLINGTON NORTHERN RAILROAD YARDS					
18	MILWAUKEE ROAD RAILROAD YARDS					
19	PUGET SOUND FREIGHT LINES					
20	OLIVINE					
21	BORNSTEIN FOODS					
22	PUGET SOUND LAUNCH AND CHANDLERY					
23	TIME OIL					
24	O.N.C. MOTOR FREIGHT					
25	NAVAL RESERVE					
26	GEORGIA-PACIFIC					
27	CROY CONSTRUCTION					
28	BUILDERS CONCRETE					
29	CHEVRON OIL DISTRIBUTOR					
30	DAHL FISH					
31	INDUSTRIAL ELECTRIC					
32	BELLINGHAM TUG & BARGE (FOSS)					
33	PUGET SOUND FREIGHT LINES					
- 34	WHATCOM CREEK PARK SITE					
35	PORT OF BELLINGHAM NORTH TERMINAL					
· 36	R.G. HALEY INTERNATIONAL					
37	FRANK BROOKS (LEASE TO GEORGIA-PACIFIC)					
38	BOULEVARD PARK SITE					
39	APARTMENTS AND CONDOMINIUMS					
40	TEXACO DISTRIBUTOR					
41						
41 42	REID BOILER WORKS					
	UNIFLITE					
43	PORT OF BELLINGHAM SOUTH TERMINAL					
44	PETER PAN SEAFOODS					
45	FAIRHAVEN SHIPYARD					



The City's largest ownership on the waterfront is the Sewage Treatment Plant at Post Point. The Port owns the South Terminal area. Land between Uniflite and the Boulevard Park is in small private ownership.

The Boulevard Park is a combination of Port, County, and City ownership. Interspersed within the park are areas of small private and large private ownership. From Boulevard Park to North Terminal the land is in large private ownership.

The North Terminal is owned by the Port. Georgia-Pacific owns the majority of its site, and is one of the major private land owners on the Bellingham waterfront.

The area just north of the Whatcom Waterway in the Whatcom Fill area is in small private ownership. Most of the former sanitary land fill area in the center of the Whatcom Fill is owned by Georgia-Pacific. The northern edge of Whatcom Fill along the I & J Waterway is in small private ownership.

North of the I & J Waterway and continuing to the northern study boundary, shoreline land is owned by the Port. Their ownership includes: the northern edge of Whatcom Fill; the Squalicum Marina; and land leased by Bellingham Cold Storage, Mt. Baker Plywood, and Columbia Cement.

The railroads (Burlington Northern and Milwaukee Road) are major land owners, owning a right-of-way strip along the entire waterfront. The right-of-way varies in width from 50 to 100 feet except in switching yards where the width is considerably larger.

Tideland ownership is very similar to upland ownership, except outboard of the Whatcom Fill, where several small ownerships are intermixed with Georgia-Pacific. However, Georgia-Pacific either owns or leases the entire area in front and south of the sanitary fill to the boundary of the Whatcom Waterway and the inner harbor line.

3. LAND USE

Current land use within the study area is reflected in Figure 16. From the north end of Chuckanut Peninsula to Post Point is the Burlington Northern Railroad track which borders the water and is overlooked by single family homes. The railroad tracks are on or near the waterfront along the entire study area.

The Port's South Terminal is located just north of Post Point, at Padden Creek in the Fairhaven Neighborhood. Light industrial or manufacturing land uses in the area include: Fairhaven Shipyard, Peter Pan fish processing, Port warehouses, office space, Uniflite fiberglass boat construction, the City's sewage treatment plant, the Bellingham Tennis Club, and Roger Sahlin's property (formerly Wright Brothers Shipbuilding). The South Terminal is presently not used to receive heavy shipping due to the deteriorated structural condition of the pier. The Port developed and maintains a public park area on the shoreline adjacent to Fairhaven Shipyard. The Port also has a public boat-launching area just south of Squalicum Creek. Overlooking this area are single family residences and the Fairhaven Business District. Harris Avenue, the main arterial through the South Terminal, is also a major arterial through the Fairhaven Business District.

North of Uniflite is the Reid Boiler Works and an unused railway pier owned by Burlington Northern. Next, in the Bayview Neighborhood, is the site of the City's proposed Boulevard Park. Overlooking the southern half of the park off of State Street, are several apartments and condominiums. The northern portion of the park site overlooks the railroad tracks owned by Burlington Northern, whose right-of-way again borders the shoreline in this area.

North of the park site is land owned by Frank Brooks but leased to Georgia-Pacific and presently used for warehousing. R. G. Haley, engineered wood products, lies between Brooks and the North Terminal. The North Terminal is presently the Port's only deep water port facility in Whatcom County. Adjacent to the North Terminal is Georgia-Pacific. Southeast of the Georgia-Pacific and the waterfront is the Sehome Neighborhood. Northeast of Georgia-Pacific is the downtown or C.B.D.

North of Georgia-Pacific is the Whatcom Waterway, Whatcom Creek, and the Whatcom Fill. In the Waterway at Roeder are Puget Sound Freight Lines (Citizens Pier) and Bellingham Tug and Barge. Inland land-use along Whatcom Creek to Dupont Street on the south shore includes: two seafood restaurants, a retail fish store, a tavern, and the post office. On the north shore are building materials and supplies and the City's old sewage treatment plant. The Whatcom Fill is occupied by a variety of light industrial and/or manufacturing uses including on the south,

Croy Construction, Chevron Oil, Dahl Fish Company, and Builders Concrete. The central area, site of the former sanitary land fill, is used by Georgia-Pacific for dry land log storage. On the north end of Whatcom Fill is Bornstein Seafoods, Time Oil, ONC Motor Freight, Olivine, Puget Sound Freight Lines, Puget Sound Launch and Chandlery, and the Naval Reserve Training Center. The north portion of the fill is adjacent to the I&J Street Waterway. Overlooking the Whatcom Fill is the Lettered Streets Neighborhood.

North of the I&J Street waterway is an undeveloped mudflat, site of the Port's proposed harbor expansion. Upland of the flats is a Burlington Northern's yard area, a steep embankment, and the single family homes along Eldridge Avenue. This area is in the Columbia Neighborhood. North of the mudflats is the existing Squalicum Marina and fill, which not only provides moorage for a large number of pleasure and commercial craft, but also land for a variety of commercial and light industrial uses. At the south end of the harbor area are Port-operated web houses, two Port-owned commercial buildings, and two yacht clubs -- the Bellingham Yacht Club and the Squalicum Yacht Club. Inland but still within the fill area is Weldcraft Steel -- boat repair and manufacturing. The northern half of the Squalicum Fill area is occupied primarily by fish processing and storage. Most of this area is leased from the Port by Bellingham Cold Storage with portions sublet to fish processing companies. main exception is a vegetable processing operation (Bellingham Frozen Foods) in the middle of the BCS compound. Inland of the fish processing area is land occupied mainly by oil distributors; then there is a steep embankment with single family homes along the crest.

North of the Squalicum Fill is the Squalicum Creek Waterway. Next is additional BCS area and the Mt. Baker Plywood Company. North of the plywood company is a relatively natural gravel beach area. At the north end of the study area is the Columbia Cement Company pier. The plywood company and cement pier are outside the City limits in Whatcom County. The City limits do extend north inland from the waterfront. This area is known as the Technical School Neighborhood.

4. POPULATION AND HOUSING

All information presented in this section is derived from the report titled, "Population and the Economy," by Barry Bjork dated November 1972. (3)

Starting from the south, City Neighborhoods bordering the study area include Edgemoor, Fairhaven, Bayview, Sehome, Downtown, Lettered Streets, Columbia, and Technical School. Selected 1970 census block statistics for those neighborhoods are shown in Table 5. Again starting from the south, census subdivisions encompassing the study area include numbers 18, 16, 15, 13, 14, 6, 5, and 4. Population growth or loss within these subdivisions for the period 1960 to 1970 is shown below:

Subdivision	1960 Pop.	1970 Pop.	%	Change
18	1657	2151		+29.8
16	2272	2151		- 5.3
15	3823	7326		+91.6
13	996	858		-13.9
14	770	420		-45.5
6	1967	2128		+ 8.2
5	1646	1810		+ 9.9
4	3428	3577		+ 4.3

Since several of the City's major employers are located within the coastal zone (Georgia-Pacific, fishing and fish processing, shipbuilding and repair), future plans for this area can have a significant impact on the City's economy and population. Also, improvement of the environment within the coastal zone can make residential areas near the waterfront more desirable, and increase demand for housing in those areas. Except for a few apartments along State Street in the Bayview Neighborhood, there are very few persons presently living within the actual study area.

5. TRANSPORTATION

Existing transportation facilities are shown on Figure 17. In the Chuckanut Bay area, Chuckanut Drive is the major arterial connecting the southern residential areas with the remainder of Bellingham. Field-stone Road runs along the crest of Chuckanut Peninsula leading to the two residential homes at the point.

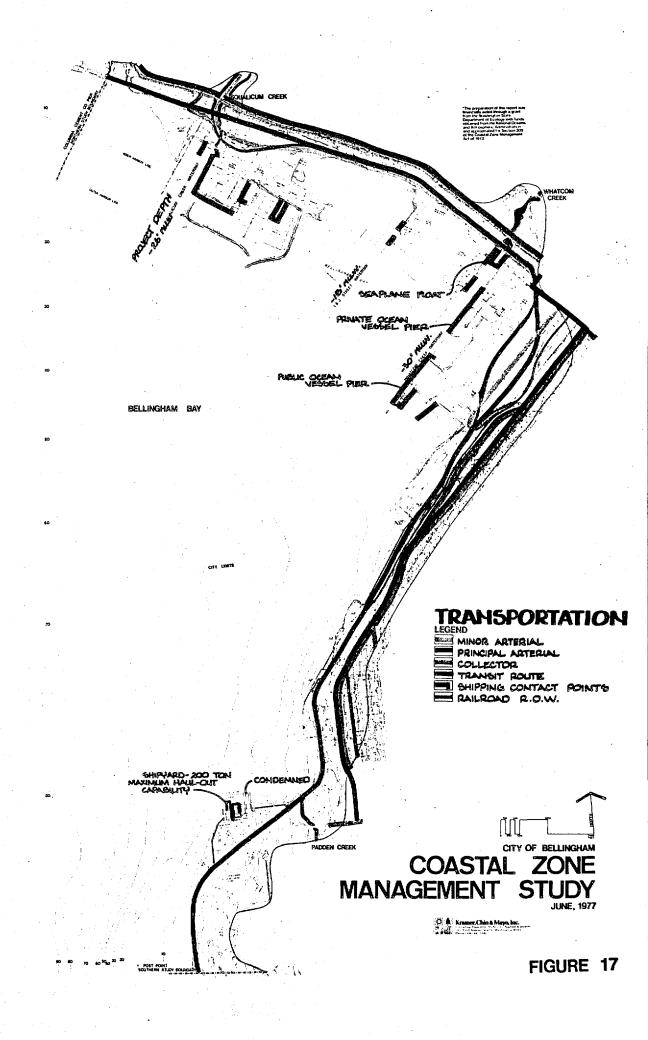


TABLE 5
1970 CENSUS BLOCK STATISTICS

			% of	Total										_				V			W	7 1		
			Popu1	ation			Housi	ng Unit	S		Owner	S		Ken	ters			Vacar	ıcıes		rits	cellane	∌ous	
	TOTAL POPULATION	1	Under 18	18-62	62+	Total Housing Units	Lacking Plumbing Facilities	1- Unit	10+ Units	Total Owner Occupied	Lacking Plumbing Facilities	Average No. Rooms	Average Value \$	Total Renter Occupied	Lacking Plumbing Facilities	Average No. Rooms	Average Rent \$	Total *	% of Total Units	1.01 Per Room	With Plumbing	l person Household	With Female Head	With Roomers
	Tech, School	425	30.6	51.1	18.4	161	0	141	0	125	0	5.1	15,636	22	0	4.2	155	14	9.5	3	3	28	11	3
	Columbia	4,523	30.2	49.3	20.5	1631	13	1497	.10	1141	2	5.5	15,097	418	10	4.5	101	72	4.4	55	52	309	139	43
	Lettered Street	2,648	24.2	52.7	23.1	1245	57	633	180	471	5	5.5	13,152	647	23	3.7	90	127	10.2	15	12	141	30	19
6.9	Downtown	800	6.4	56.3	37.3	659	198	72	431	49	1	5.2	14,300	498	137	2.6	84	112	17.0	9	6	414	20.	13
	Sehome	2,643	8.1	77.8	14.2	1180	171	364	380	247	Ö	5.9	16,950	872	149	3.5	108	61	5.2	35	24	464	36	163
	Bayview	1,407	19.3	65.7	15.1	606	13	244	200	198	1	6.2	24,067	383	12	3.9	124	25	4.1	32	31	151	31	70
	Fairhaven	746	17.7	48.8	33.5	383	12	181	119	142	2	5.3	13,400	195	7	3.6	96	46	12.0	7	7	143	18	16
	Edgemoor	1,050	42.9	43.8	13.3	318	2	314	0	291	2	6.9	38,006	21	0			6	1.9	7	7	21	11	2
	Totals for Bellingham	39,375	24.7	59.5	15.8	14,464	589	10,496	1770	8422	63	5.6	18,700	5340	416	3.6	100	702	4.9	519	490	3494	878	758

NOTE:

Discrepancies between totals of data from neighborhoods and totals for Bellingham are due to processing errors by the Bureau of the Census and data withheld to avoid disclosure of information for individual housing units. Thus certain figures are included in totals for the city, but not in neighborhood, block figures. The largest single factor affected by this is the per cent of total units.

In the Fairhaven/South Terminal area, Harris Avenue connects to the industrial activities at the terminal. The South Valley Parkway is the main southern connection to the freeway. Twelfth Street and Eleventh Street lead from Fairhaven to the north, connecting with State Street at Adams Avenue. State Street and Boulevard Avenue are the main connections between South Terminal and North Terminal.

At North Terminal, Wharf Street is a switchback Road from State Street down to Cornwall Avenue. Cornwall and State serve the North Terminal and southern Georgia-Pacific areas. Cornwall and State continue into Downtown, as well as intersecting with Chestnut and Holly Streets. Chestnut and Holly serve the northern Georgia-Pacific area to Whatcom Waterway where Chestnut connects to Roeder Avenue.

Roeder serves the Whatcom Fill and Squalicum Marina area. Holly Street, which is upland of Roeder, connects with Eldridge Avenue at Broadway. Broadway, F Street and Prospect Street are three of the major streets connecting the waterfront to Downtown. Roeder Avenue connects to the Squalicum Truck Route, the main northern waterfront connection to the Freeway. Roeder and Eldridge continue north nearly to the northern City limits. Eldridge connects to Lindbery Avenue which connects to Marietta Road leading along the waterfront to points north.

In general, industrial traffic originating at Bellingham Cold Storage has good access to the Freeway via Squalicum Way and traffic originating in the South Terminal has good access via the Valley Parkway. However, existing connections between Harris Avenue and the Valley Parkway are not optimal. According to the City Traffic Engineer, the area around the Whatcom Fill, Georgia-Pacific, and North Terminal is considered a problem area because traffic in this area, which is destined for the freeway, must either travel along congested City streets or move along the waterfront to the north or south ends. There is no single arterial route along the waterfront and this sometimes leads to confusion and/or congestion. In addition, existing traffic is exceeding the capacities of Holly, Eldridge and State Streets in the waterfront area.

Facilities for bicycles along the waterfront are generally non-existent and bicycle riders presently must compete with cars and trucks for the right-of-way. There is also either a lack of sidewalks or the existing sidewalks are in poor condition.

In most areas, Bellingham Municipal Transit does not directly serve the waterfront. Route 1 (S. State-Victor-Meridian) runs from Fairhaven along State Street to Downtown. Route 3 (Eldridge-College) is routed along Holly, Eldridge, and Marine Drive. (31) Burlington Northern and the Milwaukee Road serve the waterfront industries. Burlington Northern provides waterfront service to industry in the southern half of the City and to Georgia-Pacific. The Milwaukee Road serves the northern waterfront to Squalicum Waterway where their tracks head inland. Burlington Northern serves industries north of Squalicum Waterway. Burlington Northern and Milwaukee share tracks from Post Point to Georgia-Pacific. Both have tracks into Downtown and both have tracks along the northern waterfront, with Milwaukee tracks having the inboard or waterside location. Burlington Northern has a depot for AMTRACK service at C Street. There is one northbound and one southbound AMTRACK train daily.

6. UTILITIES

In general, most utilities in the waterfront area are adequate for the existing land uses. Major utilities serving the waterfront are shown on Figure 18. In 1973, Public Works published a report on the Comprehensive Study of the Bellingham Water System. (32) At that time, average daily domestic usage was 9,169,000 gallons. The source of water is Lake Whatcom and this source is supplemented by water from the Nooksack River. The domestic system is divided into six distribution zones. Georgia-Pacific has a separate distribution system but utilizes water from the same source. In 1973, their demand was 53 million gallons per day. In general, both pipe sizes and pressures are adequate for both existing waterfront uses and limited expansion. There are 16-inch mains serving the northern industrial area with pressures of 70 to 100 psi. The southern industrial areas are served by 12-inch mains with pressures of 130 to 180 psi.

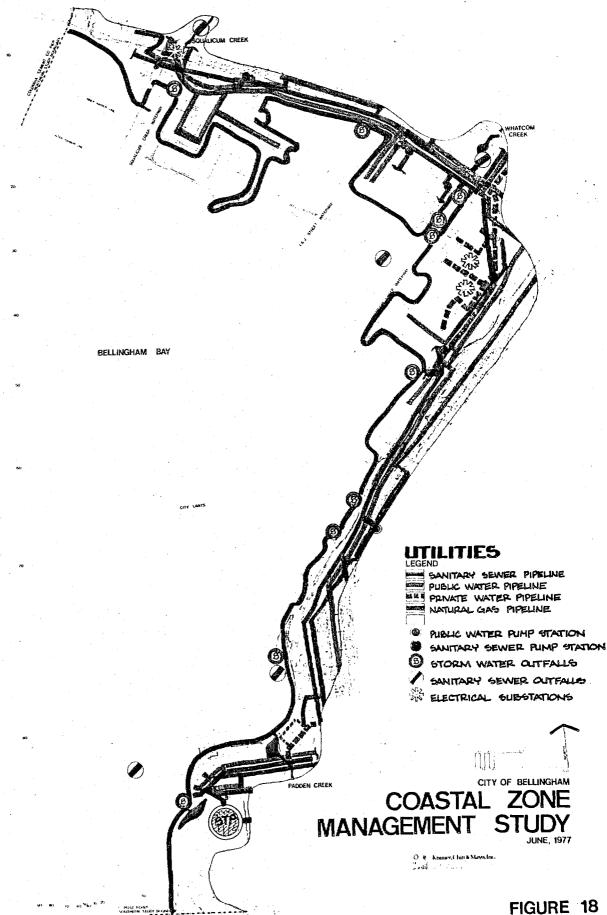
Most waterfront land uses are now connected to the City's Sanitary Sewer System and Primary Sewage Treatment Plant at Post Point. The lines serving the waterfront area are relatively new and appear adequate for existing loads and a limited amount of expansion. There is a problem with pumping station overflows into the Bay during heavy rainfall. Much of the older area in Downtown, upland from the waterfront, is served by a combined storm and sanitary system. This system now flows or is pumped to the City's treatment plant. The City and its consultant are presently studying the impacts and cost of system wide infiltration/inflow and the possible benefits to be derived from separation of storm and sanitary sewers in the downtown area. In addition, the City is considering secondary treatment which would require a significant expansion of the existing plant at Post Point. Georgia-Pacific's industrial wastes are not discharged into the City system and Georgia-Pacific is presently planning its own secondary treatment and outflow facility. City moorages also are not connected to the sewer and there are no pump-out facilities in the Squalicum Harbor. This will probably be a requirement in the future.

Kramer, Chin & Mayo, Inc. studied storm drainage for the City in 1973. A report entitled "A Comprehensive Drainage Plan for the City of Bellingham, Washington" was issued in July of that year. (33) In terms of water quality within the Bay, both the direct storm runoff from industries along the waterfront, as well as runoff entering Padden, Whatcom, and Squalicum Creeks and then entering the Bay, is of concern. The City is currently considering the establishment of a storm drainage utility charge which would help pay for some of the improvements recommended in the 1973 study. Several of the recommendations are already in effect.

Electrical supply along the waterfront is also adequate for existing demand. Puget Power and Light offers users a variety of voltages within their rate structure. A spokesman for Puget Power indicated that any significant increase in demand at Bellingham Cold Storage will necessitate some revisions in the distribution system for that area, but otherwise the system can handle a limited increase in demand. There are several electrical substations serving the waterfront area, and these are shown on Figure 18.

7. OTHER CITY SERVICES

Because of the small resident population within the study area, city services such as schools and libraries are not directly affected to any



significant extent by planning for the coastal zone. Therefore, these services will not be considered in this study. The City's parks and recreation services are considered separately in the next section. Bellingham's Police and Fire Departments both serve the study area. Neither currently has any waterborne capability. The Police Department anticipates having to add the waterborne capability and increase their patrol force in the future. Some types of crimes are increasing along the waterfront but the increases are generally similar to increases in other areas. The City's current Fire Protection Plan was published in 1973. The northern waterfront and South Terminal industrial areas are considered high-risk areas. The plan recommends a 20-foot craft equipped to pump 2000 to 3000 gpm. No moorage location is recommended.

8. PUBLIC ACCESS, PARKS AND AESTHETICS

To determine the existing conditions of the water-shoreline interface, a beach walk was conducted at low tide on May 5, 1977. The entire shoreline was walked and inventoried from Post Point to the Columbia Cement pier. The 7-1/4-mile walk has been documented generally in the following text.

A few general observations were made that apply to the entire shoreline: 1) There is no natural shoreline within the study area. 2) The
existing beach and tidal zones are loaded with debris from neighboring
uses. 3) Currently, there are only 800 feet of shoreline that is freely
accessible to the public. 4) Visual accessibility of the shoreline is
limited. Views of Bellingham Bay and Lummi Island are frequent from
the automobile and for the pedestrian. This visual access is most available from State Street, Boulevard Avenue, and portions of Roeder Avenue.
5) Public accessibility to the beach is only available at low tide.
(No one was observed using the waterfront on May 5th, which was one of
the lowest tide days of the year, -2.7 feet.)

This visual and aesthetic quality of the shoreline must be addressed from two perspectives: 1) the aesthetic quality of the waterfront at close range (within 100 feet of the observer) is very poor due to the abundance of debris accumulated in the tidal zone and their associated odors and visually disruptive character, and 2) the long views from the

beach to waterfront industry and Bellingham Bay provide for the observer major focal points of interest and are a positive visual and aesthetic asset.

The City of Bellingham currently has plans to increase the visual and physical accessibility of the shoreline to the general public by means of increased park acreage on the waterfront. The 1975 Preliminary Parks and Recreation and Open Space Plan estimates a current need of 553 acres of saltwater park space, and by 1990, a need of 709 acres. (35) The only saltwater park existing at present is a 1.5-acre park developed by the Port of Bellingham near the South Terminal area.

While proposed new parks at Whatcom Creek and Boulevard, along with the Port of Bellingham's South Terminal park and proposed Squalicum Harbor development, will provide the beginnings of a viable marine park system; the City will probably never meet the projected demand estimated in the park plan. In fact, if a park system was developed 200 feet wide from Chuckanut Bay to the Columbia Cement pier, it would only meet about one-half of the projected demands for saltwater park acreage.

CHAPTER 7

CLASSIFICATION OF EXISTING USES

1. CRITERIA OF WATER DEPENDENCY

The City's Shoreline Master Program defines water-dependent uses in an Urban Environment as follows: (29)

- o Public or private terminal and transfer facilities which handle general commerce.
- o Ferry and passenger terminals.
- o Ship construction and repair facilities.
- o Marinas and mooring areas.
- o Tug and barge companies.
- o Pulp and paper mills which require water transport.
- o Lumber and plywood mills which require water transport.
- o Fish processing plants.
- o Sand and Gravel companies which require water transport.
- o Petroleum handling and processing plants which require water transport.

Further uses which offer an opportunity for a substantial number of the general public to enjoy the shorelines are defined as follows:

- o Public ecological and scientific reserves.
- o Public waterfront parks.
- o Public use beaches.
- o Aquariums available to the public.
- o Restaurants available to the public.
- o Resorts and convention centers available to the public.
- o Uses similar to the above which can demonstrate that they offer an opportunity for public enjoyment of the shoreline.

Utilities and circulation facilities necessary to accommodate the above uses are permitted.

2. WATER-DEPENDENT USES

Based upon the foregoing criteria, the following private firms within the City's Urban Environments are considered water-dependent (Refer to Figure 19:

Fairhaven Shipyard Peter Pan Seafoods Uniflite Georgia-Pacific Bellingham Cold Storage (south of Squalicum Creek) Schenk Seafoods Lummi Indian Tribal Enterprises (fish processing) Weldcraft Steel and Marine San Juan Seafoods Pacific Pearl Seafoods Vita Foods Bellingham Tug & Barge Bornstein Foods Dahl Fish Company and Sea Pac Puget Sound Launch & Chandlery Puget Sound Freight Lines (Citizen's Dock operations only) Columbia Cement Chevron U.S.A. Builders Concrete Northern Engine Bumble Bee Seafoods

3. NON-WATER-DEPENDENT USES

The following private firms within the City's Urban Environments are considered non-water-dependent:

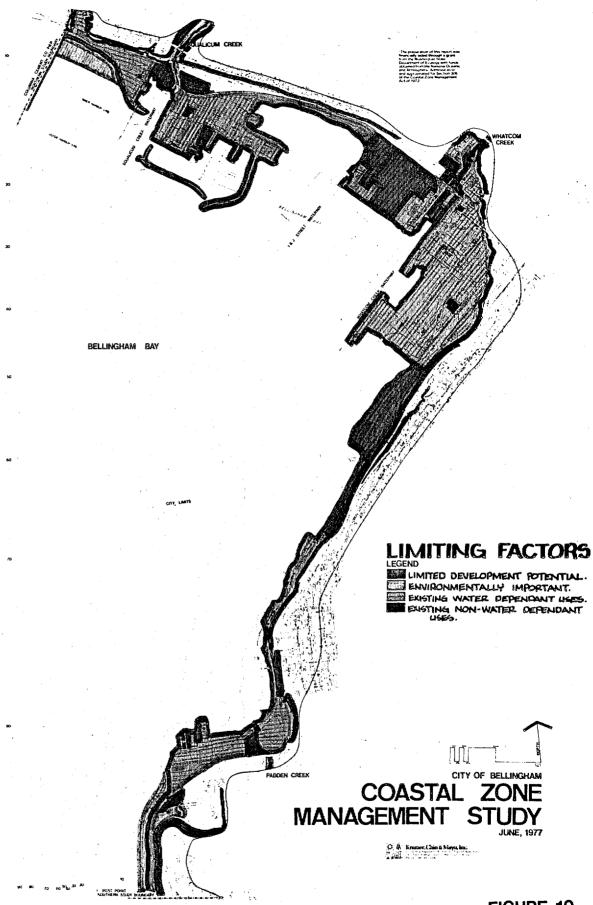


FIGURE 19

Croy Construction
Olivine Corporation*
Georgia-Pacific Lumber Company
Georgia-Pacific Warehousing (tenant of Frank Brooks)
R. G. Haley International
Naval Reserve Training Center
Texaco Oil
Industrial Electric
Yorkston Oil
Northwest Fuel
Bellingham Frozen Foods
Reid Boiler Works
O.N.C. Motor Freight
Sanitary Service Company

The Bellingham Cold Storage facilities near Squalicum Creek would be a water-dependent use within an Urban Environment. However, they are located in a Conservancy Environment and are nonconforming within that type of environment.

Mount Baker Plywood and the Columbia Cement Pier are considered water-dependent uses within the County.

The residential apartments in the Boulevard Park Area are within a Conservancy Environment and are considered a water related use because of the view factor.

^{*} If Olivine builds a magnesium oxide plant, they will require more olivine which will then be supplied by barge. Presently all materials arrive by truck.

CHAPTER 8

PUBLIC AND PRIVATE DEVELOPMENT PLANS

1. CHUCKANUT BAY - SOUTHERN EDGEMOOR

There are no definite plans in this area. The only changes being discussed at present are to acquire more land for public recreation. The delicate ecological nature of this area will probably not support intensive public use. The recent Marine Shorelines Study of Public Access and Recreation Sites in Whatcom County strongly recommends preservation of the Chuckanut Peninsula in a natural state. (36) The study notes that this land, which is in single ownership, represents Bellingham's last chance for a large waterfront park.

2. NORTHERN EDGEMOOR

There are no definite plans for this area. The major waterfront owner is Burlington Northern and the company plans no changes. This area has relatively deep water compared to the northern bay and as such has potential for industrial development. However, this is not meant to imply that any such development is planned or recommended.

3. SOUTH TERMINAL - FAIRHAVEN

The Port is reserving the South Terminal for industrial use because of the deep water, favorable soil conditions, rail service, and good access to the freeway. The Port has applied for an EDA grant to study the economic feasibility of further developing this area for some type of water-dependent use. This study would also look at the potential for filling the Padden Creek mudflats out to the railroad tracks. At this time, the Port plans to retain the public boat launch in this area even if Squalicum Harbor is expanded.

However, a study of the Fairhaven area by James Zervas, recommends a significant recreational development in the Padden Creek area with "public areas for viewing the water and harbor activities, and a small boat haven and marina for pleasure and fishing boats." While the Port would support recreational development along the banks of Padden Creek to the Bay through a filled area, the Port opposes the Zervas concept. The Fairhaven Business District is not only popular with Bellingham residents, but is probably one of the City's major tourist attractions. It should continue to grow as additional old buildings are restored.

The waterfront firms in the South Terminal are generally happy with their present space except for Uniflite which is looking for space to expand. A spokesperson indicated that Uniflite would prefer land contiguous to their present area. They are interested in the potential Padden Creek fill area although they do not necessarily need additional access to the water. Fairhaven Shipyard is just getting started and will probably expand their operations on their present site if the Port cooperates in upgrading their haul-out capability. Peter Pan is satisfied with their location, but this is partially because of the lack of alternatives. The distance from the marina and cold storage causes Peter Pan some problems. Peter Pan also lacks any expansion capability in its present location. The Wright Brothers area has recently been sold to a group headed by Roger Sahlin. Uniflite is one of the companies exploring the possibility of temporarily leasing space in this area, but nothing is definite. The City's sewage treatment plant has sufficient space, but may need to add secondary treatment in the future. A consulting firm, CH2M-Hill, is presently studying the condition and needs of the sewer system for the Public Works Department. The arterial street system in the Fairhaven area may eventually be changed. The City's arterial plan shows 10th Street extended south to Harris and a connection from Harris along 6th Street and Donovan to the Valley Parkway.

4. BOULEVARD PARK - BAYVIEW

Except for the park and the State Street-Boulevard corridor, there are no major plans for this area. The park is in the conceptual-schematic stage. The City plans to ask Bellingham voters for bond funds for development of the park. This park will be only one element of a parks and

recreation bond package. The landscape architecture firm of Jongejan/
Gerrard is designing the park. The concept for the park is primarily
natural and passive. According to the Public Works Department, Boulevard
(the street) will likely be upgraded and possibly widened in the future.
South of the park, Reid Boiler Works has no definite plans. If the firm
ever needs to move, it would search for inland property near a railhead.
Texaco, which occupies space between Reid Boiler Works and the park,
also has no plans. The Burlington Northern owns the old pier immediately
south of the park. Burlington Northern would eventually like to demolish
the pier, but has no definite plans to do so. The park designer has
suggested a future plan incorporating this pier into Boulevard Park for
public use.

A few years ago, the City, Milwaukee Road, and Burlington Northern discussed additional consolidation of railroad facilities in Bellingham. Although these discussions centered on Milwaukee and Burlington Northern tracks and facilities in downtown, there was also some discussion of the abandonment of one of the tracks along Boulevard Street. The idea was for Burlington Northern and Milwaukee to share a single track into the City and for the line along Boulevard to be abandoned. The right-of-way for this line then might become a pedestrian, bicycle, recreation commuter route from the center of the City to the proposed Boulevard Park. Although nothing was decided at the time, the City has written the Milwaukee Road expressing interest in reopening negotiations on this subject.

NORTH TERMINAL

South of the North Terminal is private land presently leased by Georgia-Pacific. Frank Brooks, the owner, may renew Georgia-Pacific's lease but says he is open to a change in use related to the proposed Alaskan Ferry Terminal. Between Brooks and North Terminal is R. G. Haley. This wood products firm has no plans for major changes. They have no land available for expansion. The Port's plans for the North Terminal are connected both to the Alaskan Ferry and to the results of their studies

of the South Terminal and Cherry Point areas. The transfer of Alaskan Ferry terminal facilities from Seattle to Bellingham is not definite. If it happens, present thinking is to utilize the existing rail barge pier. There is a significant amount of parking and also additional public waterfront access and park space associated with the Port's current conceptual plan. Recently, Tom Glenn, Port Manager, suggested another possible future use for the site: establishment of a Bellingham Waterfront Tour Center in this area. The Alaskan Ferry, other ferry operations, charter boats, and private restaurant development would form the basis for the Center

6. GEORGIA-PACIFIC

Georgia-Pacific's total plans are uncertain at this time. The company will be increasing sewage treatment capabilities. Plans call for installation of a 1000- to 1500-foot outfall into the Bay. Studies are currently underway to determine optimum location and depth. The company is using most of the sanitary fill area in Whatcom fill for dry log storage. The company cannot predict future use when fill stabilizes. Georgia-Pacific has long-term plans to relocate their retail lumber company inland as it does not require a waterfront location. The area between the lumber company and the existing railyard has potential for railyard use or Georgia-Pacific use.

7. WHATCOM WATERWAY - WHATCOM CREEK

The Puget Sound Freight Lines may sell the Citizens Dock on Roeder Avenue. They are using it for storage and could relocate the storage onto barges or to Seattle. Under an agreement between Puget Sound Freight and the City, the City has an option to purchase the pier from Puget Sound Freight once every 5 years. Also on the waterway at Roeder is the office of Bellingham Tug and Barge. Currently three Foss tugs are ported in Bellingham. The company may consider adding a fourth tug if the oil industry workload continues to increase. A current and future problem for the company is auto parking in the office area for tug crews.

In 1973-1974, a consultant team headed by John Morse & Associates prepared a park plan for Whatcom Creek between the waterway and Dupont Bridge. The plan proposed two phases of development including: acquisition of several private properties and businesses; park development for primarily passive use; and development of a demonstration fish hatchery, cultural center, and amphitheater. The park is to be a historical and cultural focal point for the City and in particular the downtown and government center. There is no definite implementation schedule for this park. It will probably not be part of this fall's bond package, but the City would like to develop the entire park at one time rather than in two stages. Detailed planning studies of both the government center and downtown area are pending.

8. WHATCOM FILL - LETTERED STREETS

The Whatcom Fill area is privately owned land with the north and south areas in small parcels and most of the large central-sanitary fill area owned by Georgia Pacific. In the southern portion of Whatcom Fill, Puget Sound Freight Company is considering relocation of their truck terminal within 2 to 3 years. They would favor a location in south Bellingham near I-5. Puget Sound Launch and Chandlery would like to expand their operations to include a restaurant. Therefore they are considering expanding by increasing dryboat storage and adding a waterfront restaurant. Groy Construction currently has no expansion plans. If they ever decide to expand, they would probably relocate inland due to lack of space at their present location. Builders Concrete also has no definite plans, but if an inland source of sand and gravel could be identified, they would consider relocating off the waterfront. Presently, the majority of their sand and gravel is delivered by barge.

Burlington Northern operates a train depot inland of Roeder in this area. They currently plan no changes in their operations from this facility. Chevron-Standard Oil which operates at the Bay end of the fill has no changes planned at this time.

As previously noted, Georgia-Pacific, which owns the former sanitary fill area has no plans to change this area from its current use as dry log storage.

On the North, Bornstein Foods foresees a need to expand as a result of the establishment of a 200-mile limit and increased U.S. fish catch. They presently are negotiating with Time Oil for the land south of Bornstein. Neither O.N.C. Motor Freight nor the Naval Reserve foresee any major changes in their operations or physical facilities. The Olivine Company would like to construct a magnesium oxide plant. They are looking at land north and east of the present site.

The Lettered Streets neighborhood was the subject of a recent plan for the City by a consulting firm. (39) The plan recommends a conservation approach due to historical resources within the neighborhood. The plan recommends a two-phase approach (short range and long range). Recommendations include zoning changes, street improvements, sidewalk/pedestrian improvements, and recreational facilities. Some improvements in this neighborhood have already been completed under the City's Block Grant Program.

9. I & J WATERWAY

The I & J Streets Waterway will probably require dredging if Squalicum Harbor is expanded. Also, in this general area, the City, with help from the Port, plans to improve and widen Roeder Avenue to four lanes from C Street on the south to the City limits on the north. Plans also call for landscaping, bicycle lanes, and pedestrian walkway. The Public Works Department will be studying possible connections to the north and south ends of this improved arterial in the near future.

10. SQUALICUM HARBOR

The area south of the existing marina is undeveloped but this area is the site of the Port's Squalicum Harbor Small Boat Basin Expansion project. A master plan for the expansion with landscaping design by

William G. Teufel & Associates Inc. was issued in September 1975. (40)
The plan recommends new pleasure boat moorage spaces and new commercial boat slips. Also included is considerable automobile parking, dry boat storage, a major restaurant, and an extensive pedestrian bikeway and pedestrian path and viewpoint system. Since 1975 an environmental impact statement has been distributed and the Port has secured most permits necessary to begin construction. Although a general obligation bond proposal for the expansion presently failed to pass and the Port is presently studying financing, this project has been assumed as a given for purposes of this study. In the existing Squalicum Harbor, the Port has planned no major changes. Weldcraft would like to see the street behind their shop area vacated so that they could expand their dry storage. Weldcraft also plans to lease land for pleasure boat repair within the expanded area.

At Schenk Seafoods there are no current plans for expansion although they expressed concern for existing and future moorage of their boats. Lummi Indian Tribal Enterprises fish processing (a tenant of Schenk's) eventually plans to relocate their processing operation to their reservation, but the timing is not definite.

11. BELLINGHAM COLD STORAGE

Although this area is contiguous with Squalicum Harbor, it is considered separately here because it is entirely fenced off from the harbor area. Bellingham Cold Storage (BCS) leases this property and property west of the Squalicum Creek Waterway from the Port. BCS would like to fill in its area west of the waterway in order to expand its fish processing capaability. Most of the individual fish processing companies within the BSC compound talk of expansion but there appears to be no definite plans due mainly to lack of space. Some are talking of adding to existing buildings. BCS is constructing two new buildings along the southeast edge of their main area. One is a warehouse and the other is a warehouse/repacking plant for Bellingham Frozen Foods (BFF). BFF has recently expanded outside of the BCS compound into the old Arco Building on the north side of Roeder Avenue. BCS would eventually like to expand their parking capacity in

this general area. Other industries in this area outside the BCS compound are Yorkston Oil, Northwest Oil and Northern Engine. The companies have no plans for either expansion or relocation at this time.

The Burlington Northern operates a trainyard inland of Roeder and the existing Squalicum Harbor. They would like to expand this yard to the north but are concerned that public opinion would be strongly against any expansion. BN is continuing efforts toward stabilization of the embankment adjacent to their present yard.

12. WHATCOM COUNTY-TECHNICAL SCHOOL

The Mount Baker Plywood Company would like to acquire additional land for dry log storage. While they have no definite plans, they would also like to expand their production capability to include outer as well as inner plys. At the northern end of the study area Columbia Cement is having problems with sedimentation near their pier. They are considering either dredging or extending the pier in the future.

The relatively natural beach area between Mt. Baker and the Columbia pier as well as the land occupied by Mt. Baker and the pier is owned by the Port. Several years ago the Port considered filling this beach area, but these plans have been dropped and the port has no current plans for this area. Whatcom County owns land inland of this area known as Little Squalicum Park. The park is undeveloped and the County has no plans or resources available to develop the park at this time. The park concept would probably include some type of access to the natural beach area if suitable arrangements could be made with the Port.

CHAPTER 9

AREAS OF CONCERN

Based upon a review of available literature, interviews with representatives of major waterfront industries and direct observations by the Consultants, the following areas of concern were identified. These areas are discussed in more specific terms under General Recommendations (Chapter 12).

1. WATER QUALITY

Water quality in Bellingham Bay has been improving in recent times due to the construction of a new primary sewage treatment plant, the hookup of many industries to that plant and other water-pollution control measures undertaken by various industries. However, there are problems in some areas of the Bay, specifically near Georgia-Pacific, near the City's sewage treatment plant outfall, near the former sanitary landfill, near sewage pumping stations during periods of overflow, near Dahl Seafoods, and in Squalicum Harbor from the lack of pump-out facilities for commercial and pleasure boats. These water quality problems affect aesthetics and public health as well as the marine organisms in Bellingham Bay.

2. AIR QUALITY

Ambient air quality standards for suspended particulates and SO_{X} are frequently exceeded. The major industrial contributors to air pollutant emissions are Columbia Cement, Georgia-Pacific, Mt. Baker Plywood and Olivine. Auto and truck emissions are also significant air pollutants in Bellingham. Odor problems are associated with diesel trucks and ship traffic, the operations of Georgia-Pacific, fish processors, the Post Point sewage treatment plant, Uniflite Fiberglas Operations, and various mudflats.

3. NOISE

There are probably localized high levels of noise, but there is a lack of data concerning this type of pollution. Bellingham has no noise control ordinance.

4. FLORA & FAUNA

Organisms in certain areas of the shoreline and near-shore environment have been adversely impacted in the past due to physical changes and water quality factors. Landfill at any location in the coastal zone has the potential for further adverse impacts on flora and fauna.

5. NON-WATER-DEPENDENT SHORELINE USES

A significant amount of waterfront industrial land is presently being utilized by firms which have no dependence upon the water or waterfront access. Consequently, these lands are not being used to their fullest potential.

6. LAND AVAILABILITY

Although several industries indicated a desire to expand their operations, they cited land availability as a constraint. There appears to be a great demand for additional waterfront land among the existing waterfront industries.

7. DREDGING

Sediments from the Nooksack River are gradually filling in Bellingham Bay and reducing its effective depth. It has been estimated that the river presently delivers 8.5 by 10^5 cubic yards of silt per year, much of which is deposited in the vicinity of Bellingham's shoreline which poses a serious problem to shipping operations. A continued program of dredging may be the solution. However, in some areas the sediments

in the Bay have a high mercury content and a suitable method of disposal of the spoils must be found in order to avoid adverse environmental impacts during and following dredging operations.

8. UNSTABLE LAND CONDITIONS

The sanitary landfill portion of the Whatcom fill area is presently unstable, which limits the time and degree in which this land might be developed. The use of this area for log storage, while serving to surcharge the fill to accelerate stabilization of the soils, is causing contaminants to be squeezed into the Bay waters through the inadequate impoundment structure. In general, however, most of the fills are relatively old and stable and pose no serious water quality problems.

Certain portions of the land edge are being eroded away and are in need of maintenance.

9. ROAD TRANSPORTATION

There exist road congestion problems due to freight handling and employee traffic. The widening of Roeder Avenue should alleviate this problem somewhat, but bottlenecks at either end of the proposed improvement will probably continue to occur between I-5 and the Bellingham waterfront. The present truck routes are indirect and conflict with downtown Bellingham arterials and other streets of high passenger car activity.

10. PARKING

There is a distinct lack of organized employee parking in the water-front industrial area. In many cases employees must park along the road-sides and/or walk an appreciable distance from their parking place to their job. Lack of designated parking areas in some instances causes a reduction in available maneuvering area which aggravates the parking problem.

11. MARINE TRAFFIC

In light of possible increased freighter and barge traffic and the probable increase in commercial and pleasure boating activity associated with the Squalicum Harbor Expansion, the potential for conflicts and even accidents increases. Establishment of Bellingham as the southern terminis of the Alaska Ferry would compound problems of marine traffic.

12. AESTHETICS

Water and air turbidity, visual air emissions, odors, noise, litter, building and site disrepair, and lack of landscaping are all aesthetical considerations which require attention. Water and air quality problems are being administered by the Department of Ecology and the Northwest Air Pollution Authority, respectively. There are no overall noise control or site landscaping programs at this time.

13. PUBLIC ACCESS

The City of Bellingham, and in particular the downtown area, does not focus on its waterfront. This is probably caused by the aesthetic problems noted above as well as by a lack of public access. Waterfront industry and public access can exist in harmony. The full recreational potential of the Bellingham Bay shoreline is not being realized.

14. FUTURE OF THE PORT OF BELLINGHAM AND WATERFRONT INDUSTRY

The economic future of the Port of Bellingham and other waterfront industry is somewhat uncertain. There are several unknowns which may have a significant impact on the waterfront. These include the Alaskan Ferry proposal, the establishment of the 200-mile fishing limit and the potential for containerized shipping.

15. WATERBORNE POLICE AND FIRE PROTECTION

Although not a significant problem now, increased waterfront activity will require a stepped-up program of shore and marine police patrol.

Bellingham is also presently in need of waterborne fire protection in the harbor area.

ALTERNATIVES

SECTION III

CHAPTER 10

CONSIDERATIONS FOR DEVELOPMENT OF ALTERNATIVES

1. AREA SUITABILITY FOR LANDFILL

1.1 Environmental Constraints

Environmental impacts of landfill, whether considering short or long-term effects, will depend upon the specific site. The negative impacts of diking and filling the area south of the sanitary landfill between the I&J and Whatcom Creek Waterways would not be as severe as, for example, a fill of the Padden Creek estuary.

The immediate effect of landfill at any shoreline location would be that of smothering any onsite marine populations and destroying the present habitat. Long-term water quality problems due to leaching of toxic substances from the fill sediment could be avoided through proper design of impoundment structures. Long-term effects on fish, shellfish, other marine organisms, reptiles, mammals and birds would depend upon the design of the landfill-water interface and the use to which the landfill is put. The establishment of industry or increased human activity may cause the relocation of timid marine or terrestrial species.

Flora and fauna habitats existing at the land-water interface in the study area have been presented in Figure 13. They are marine sand-cobble beach backed by man-made areas, marine sand-cobble beach backed by grassland-weed-bramble areas, marine mudflat and man-made areas. In the vicinity of the proposed Squalicum Harbor expansion are marine mudflat, and marine tidal marsh communities. Each of the above habitats has been previously discussed (Chapter 5) in terms of the organisms they have historically supported in the Puget Sound region.

Although no comprehensive studies of flora and fauna in Bellingham Bay have been conducted, it is felt that the shoreline environment has been degraded by human activity and is biologically stressed in certain areas. (18)

Consequently, there are only two shoreline areas which can be said with assurance to be moderately rich in terms of subtidal and intertidal flora and fauna. Both are marine sand-cobble beaches. The first starts south of Post Point and extends northward to the southern edge of the Port's South Terminal. The other beach runs from the northern edge of the Mt. Baker Plywood Company property past the Columbia Cement Company loading pier. It is recommended that the habitats at both sites be conserved. These two areas are identified as environmentally important in Figure 19.

Landfill at any shoreline location between those two sites would have immediate adverse effects on the existing habitats. However, depending on the design of the fill-water interface and the use to which the fill is put, long-term effects to the environment may not necessarily be unfavorable. An example of a filled area which has developed rather rich although undoubtedly modified flora and fauna is the area south of the sewage treatment plant in the vicinity of the tidal lagoon. Adverse effects to marine life could be mitigated by the reestablishment of a habitat similar to that which was covered with fill at the new land-water interface. An alternative approach would be to establish a new type of habitat (e.g., artificial reef) which would increase species abundance and diversity in the general area, and also, by nature of its design, attract a higher proportion of fin fish. This would satisfy a need for public sport fishing. In fact, due to the degraded nature of the present shoreline habitats, either of the above approaches would have an overall beneficial effect if the trend toward more stringent water pollution and other environmental controls was continued.

Industrial, commercial or public uses may be appropriate at fill areas where marine sand-cobble beach backed by man-made areas, or simply man-made areas, presently exist. Fill at areas that are marine mudflat or sand-cobble beach backed by grassland-weed-bramble areas would be suitable for conservation-oriented public uses. The filling and dredging proposed for the Squalicum Harbor expansion would be detrimental to the environment at that site but could be mitigated by the establishment of a marine tidal marsh in another area (41). An alternative mitigating measure would be to develop an artificial reef as discussed earlier.

In any instance, detailed study of the flora and fauna at each proposed landfill location will be necessary prior to design and implementation of dredge/fill operations.

1.2 Physical Considerations

1.2.1 Bottom Conditions and Fill

The information available from the available literature is not sufficient to ascertain bottom conditions. However, from other sources (42) it is apparent that most, if not all, of the bay bottom is composed of very soft mud and does not become firm or stiff until a substantial depth is reached.

A few consequences may result from the placement of fill on this material. The action of placing the fill will probably displace quantities of the soft mud causing very turbid conditions. As the fill is being placed, settlement of the soft materials will occur possibly influencing adjacent structures or fills by pulling them down as well. After the fill has been placed, settling could continue for some time, due to the gradual displacement of water from the soft layers underneath the fill.

If a particular area of interest is, in fact, underlain by stiff clays or silts or dense sands or gravels, the added fill material would still be expected to settle although the magnitude would be less.

Some consideration must be given to the subsequent use of the fill. If a park area or other open space is contemplated, settling would be of a smaller magnitude than if a building structure were to be erected.

In any case, a soils consultant must ascertain bottom soil conditions prior to filling and conduct an analysis of the fill prior to construction.

1.2.2 Impoundment Structures

The fill must be protected from wave action and tidal erosion. The least expensive way to do this is by the use of rip-rap, either rock or concrete blocks. Analysis would be required to determine the proper slope and sizes of the rocks or blocks.

A sheet pile bulkhead could be used, and would possibly result in an area suitable for docking. Because of the bottom conditions, a rather extensive analysis of the loading conditions on the bulkhead would be required. This would surely be more expensive than rip-rap.

Other bulkheads can be used, depending on the depth of the fill. Precast concrete units and under some conditions, cast-in-place concrete or timber could be used. These would also be more costly than rip-rap.

1.2.3 Prevention of Turbidity

If a problem is anticipated with dispersal of bottom deposits during filling, a wall, either a load-bearing bulkhead or merely a barrier to water flow, should be erected around the site. It may be possible to use a fabric filter strung from a floating boom and anchored to the bottom. No matter what is done, some turbidity and dispersal of sediments will take place.

2. ASSUMPTION CONCERNING NON-WATER-DEPENDENT INDUSTRIAL ACTIVITIES

Existing water-dependent and non-water-dependent uses were identified in Chapter 7 and are shown on Figure 19. For purposes of this study it has been assumed that in the long range, all non-water-dependent activities will eventually relocate or phase out of the coastal zone. Obviously, several of the non-water-dependent industries have considerable investments in their present locations and no immediate or short-term changes are expected. However, in the interviews some companies indicated a desire or willingness to consider relocation. Also, several cited a lack of expansion space as a possible future reason for moving. It is assumed that as non-water-dependent activities move out of the coastal zone, the City and/or the Port will insure that they are replaced with water-dependent activities.

3. SUB-AREAS

To facilitate the analysis of alternatives, the study area has been divided into the 4 sub-areas defined below:

<u>Title</u>	Boundaries	
	From	<u>To</u>
South Terminal	Post Point	Northern edge of Uniflite
Boulevard	Reid Boiler Works	North Terminal
Whatcom	Georgia-Pacific	Middle of I&J Street Waterway
Squalicum	Middle of I&J Street Waterway	Columbia Cement Company Pier

These sub areas were defined on the basis of natural features, existing land use and development, ownership, and future potential. They do not coincide with the sections analyzed in the State Shoreline Master Program.

4. METHODOLOGY

Two general approaches have been used to identify alternatives. One involved a fairly strict adherence to the City's shoreline environment designations from 1974. Protection and rehabilitation of relatively undeveloped areas were stressed. Except in the Boulevard sub-area, the use of fill was avoided. Alternatives identified under this approach are presented as #1 in Chapter 11.

The second approach was more open and in certain cases the resulting alternative was not in accordance with existing shoreline designations. These alternatives are presented as #2 in Chapter 11. In both cases but mainly in the second approach fill was used where it could increase public access, provide expansion space for industry or both. The only locations where fill was not considered were the environmentally important zones in the north and south ends of the study area as shown on Figure 19 and within federally designated waterways. Some of the alternatives evolved into a recreational emphasis, some evolved into an industrial emphasis and

others were mixed. Each specific area along the waterfront was examined for its potentials in terms of limiting factors (Figure 19) and planning considerations for the various types of water-dependent uses (Section 5-7 of this Chapter). Then, the relationship of each sub-area to the entire waterfront was examined to determine the most reasonable land use alternatives.

In attempting to provide a conceptual design of each alternative, assumptions were made as to configuration, the extent of fill, the amounts of land allocated to each land use, etc. Obviously considerable data, including cost estimates and other economic information, will be required prior to any final decisions. The intent here is to discuss the types of land use and not a specific design.

5. PLANNING CONSIDERATIONS FOR RECREATIONAL LAND USES

There are several recreational activities and facilities which are considered appropriate to the coastal zone. The following is a listing of these activities and facilities including a brief discussion of general siting criteria and specific planning considerations for the Bellingham Waterfront.

5.1 Pedestrian/Bicycle Paths

These facilities can be accommodated in almost any type of area ranging from natural to industrial. In a natural area one of the major considerations is protecting the environment; while in an industrial area, possible interference with industrial operations, security and user safety are considerations. Topography is an important factor particularly for bicycles. Separation from automobile traffic is usually desirable. Almost all of the sub areas could accommodate some type of pedestrian/bicycle path(s). However, in some areas, such as Whatcom, the length or location of paths would be limited due to the nature of existing industry and traffic. Where feasible, shoreline trail and path systems are generally considered desirable. The 1975 Preliminary Park and Recreation Plan (35) recommends a pedestrian/bicycle pathway system along the entire waterfront although in certain areas it would be somewhat removed from the shoreline.

5.2 Viewpoints

Other than a view, there are not many planning considerations for viewpoints. Like pathways, viewpoints can be accommodated in almost any type of environment. It should be possible to establish several viewpoints in Bellingham to take advantage of the variety of views ranging from long views of the Bay and surrounding land forms and shorter views of industrial and boating activities. All of the sub-areas have potential for viewpoints.

5.3 Picnic Areas

Picnicking can take many forms including the traditional family outing to a quick brown bag lunch. As with viewpoints and possibly in conjunction with viewpoints and restaurant facilities, it sould be possible to establish a variety of types and sizes of picnic areas in Bellingham's coastal zone. All of the sub-areas appear to have potential in this regard.

5.4 Swimming

The condition of the beach and the bottom, sun exposure, water quality, boating activities, tides and currents are important considerations in siting swimming beaches. There are no existing saltwater swimming beaches within the City Limits. The only potential swimming beach identified in the study area is the gravel beach located in Whatcom County west of Mt. Baker Plywood.

5.5 Scuba Diving

The conditions within the Bay are more important to divers than the conditions along the shoreline. Commercial diving shops selling compressed air are necessary if this activity is to be promoted but these need not be located in the coastal zone. The Bay has not been evaluated in this study for this activity.

5.6 Fishing

The most important considerations in locating recreational fishing facilities are the abundance of fish and the quality of water. For shore fishing, a pier is often desirable and may be mandatory depending on the shoreline condition and the depth of water. There are no facilities along Bellingham's shoreline that are specifically designated for public fishing. Such facilities are desirable particularly for persons without access to boats. The Whatcom and portions of the South Terminal subareas are presently designated by the City's Health Department as no fishing areas due to water quality. All other sub-areas offer some potential. There is also a potential for enhancing the fish environment in shoreline areas to improve recreational fishing.

5.7 Shellfish

The natural conditions, abundance of shellfish and water quality are considerations. Shellfish areas are not considered an in-city necessity. The South Terminal area appears to offer some potential if water quality is improved to acceptable standards. It is presently designated as a no fishing area by the City's Health Department. Again, there is a potential for improving shellfish conditions by improving the environments and planting shellfish.

5.8 Natural Preserves and Biologic Study Areas

Except for the Chuckanut area, the only existing natural preserve areas are the shoreline and tidal pool adjacent to the Sewage Treatment Plant and the aforementioned gravel beach area west of Mt. Baker. The mouth of Padden Creek is designated Conservancy II and is considered by some to have potential as a natural preserve and recreation area although it presently supports a minimal community.

5.9 Pleasure Boat Moorage

Pleasure boat moorage requires an area protected from heavy weather and waves and designed to accommodate movement by boats under sail. Water depth is also an important consideration. There appears to be sufficient existing and planned pleasure boat moorage at Squalicum Harbor to meet City needs. However, since this harbor serves a regional population, the need for additional moorage would have to be based upon additional demand analysis. For this study, only the South Terminal area has been considered for additional moorage and only because it was recommended in the Fairhaven report. Dry moorage requirements for pleasure boats include reasonably level land, with the ability to support the imposed loads. Haul out facilities are also mandatory and some covered storage is desirable. Within the study area, the Whatcom and Squalicum sub-areas appear to have the best potential due to existing space, facilities and proximity to the boat harbor. However all sub-areas have some potential for day moorage which usually requires a semi-protected float for short visits. Moorage for float planes creates requirements similar to day moorage. The only existing day and float plane moorage is located in the Whatcom Waterway adjacent to Citizens Pier.

5.10 Boat Launch

There is an existing two lane boat launch ramp at South Terminal as well as two additional lanes programmed for the harbor expansion project at Squalicum. A total of four lanes appears sufficient to accommodate present needs. Therefore, for this study, the potential for boat launch facilities has not been analyzed in other areas.

5.11 Commercial (Restaurants and Shops)

Although these activities are sometimes omitted from discussions of recreation, eating and shopping are enjoyable leisure time pursuits for many people. Also, like some other recreational activities, these activities

do not require a waterfront setting, but such a setting can be a significant amenity which adds to the public enjoyment. Commercial facilities for shopping and eating can provide public access to the water at no cost to the City while at the same time generating tax revenues which could support additional recreational space. Therefore, where appropriate, such activities are considered desirable along the Bellingham waterfront. All of the sub-areas except the area north of the City Limits appear to have some potential for commercial shopping or restaurant activity.

5.12 Resorts and Convention Centers

The planning considerations are similar to those discussed for commercial activities.

5.13 Aquarium/Fish Hatchery

These facilities can provide significant recreational and educational enjoyment. However, considerable discussion, market analysis, and study of water quality, community desires, etc. are required prior to recommending an optimal location. The Whatcom Creek Plan recommends a demonstration fish hatchery at the mouth of the creek. (38) No specific recommendations have been made for an aquarium.

5.14 General

Accessibility is an important consideration for all recreation activities. Automobile parking requirements depend on the size and type of activity. In many instances, peak periods for recreational activities and industrial work days do not coincide so in certain cases parking can be shared. Sanitary facilities are usually provided at some types of recreational facilities. Again, this depends on amount, duration and type of use. Outdoor recreation is generally not enjoyable in areas where there is continually an air quality or odor problem. High noise levels can also reduce recreational enjoyment but noise can be mitigated to some extent by design. A poor aesthetic environment such as litter or lack of landscaping can also detract from the quality of recreational experiences.

PLANNING CONSIDERATIONS FOR RESIDENTIAL LAND USES

While residential development over water is prohibited, residential uses are generally considered appropriate for the coastal zone particularly if adequate setback is provided to allow public access and use of the actual shoreline. Access, utilities, slope, soil conditions and adjoining land uses are major considerations in residential zoning. Houseboats such as found in Seattle's Lake Union and Portage Bay also are a potential waterfront use. However these generally require a fairly protected area similar to a pleasure boat moorage and have not been considered within the study area. Other than the Chuckanut area, the Boulevard sub-area seems to have the greatest potential for new residential development in or near the coastal zone.

7. PLANNING CONSIDERATIONS FOR INDUSTRIAL LAND USES

Ten water-dependent industrial uses are specified in the City's Shoreline Master Program under the discussion of Urban Environment II. The following is a list of these uses and a brief discussion of general requirements and specific planning considerations for the Bellingham waterfront.

7.1 Public or Private Terminal and Transfer Facilities which Handle General Commerce

The desirable attributes of a terminal are deep water berthing space, sufficient staging and storage space, and proximity to both rail and freeway connections. Both indoor and outdoor storage space are necessary for a successful operation. Parking is usually not a major requirement. The Port of Bellingham currently has two designated terminal facilities within the study area. Major problems with the North Terminal include relatively poor connections to the freeway and siltation near the piers requiring maintenance dredging. The South Terminal has deeper draft with less siltation and shorter connection to the freeway. However, the structural condition of the pier at South Terminal is such that this terminal is presently not used for heavy shipping. The South Terminal and

Boulevard sub-areas, where the present terminals are located, are the only sub-areas with the potential for terminal and transfer facilities.

7.2 Ferry and Passenger Terminals

This type of use requires an unloading pier, shoreside facilities for handling baggage, cargo and passengers and a significant parking and/or automobile waiting area. The size of these facilities depends on the magnitude and type of ferry operation. The draft requirements also vary with the type of ferry or ferries. There are presently no ferry terminals in Bellingham but the Port is negotiating with the Alaska Ferry to relocate its southern terminal facilities from Seattle. A conceptual design has been prepared by the Port utilizing space and facilities at the Port's North Terminal. The ferry would have impacts on City and County transportation systems, the hotel and restaurant trades, and many other commercial businesses. According to the Port, the relatively infrequent visits and proposed arrival/ departure times of the Alaskan Ferry will cause no significant conflicts with existing waterfront traffic. Port Manager Tom Glenn has recently suggested the possibility of a Tour Center at North Terminal with potential passenger service between Bellingham and Victoria, scenic tours, charter fishing and boat rentals. While the North Terminal location has obvious advantages for such a concept, multiple vessels operating from this location could generate significant traffic in an already congested area.

7.3 Ship Construction and Repair Facilities

The requirements for ship repair include adequate haul out facilities and space for the type of ships repaired, and adequate dry storage space for certain types of repair work. Some repair work can also take place in the water, so moorage space is also a necessity. Water depth requirements depend on the type of ships or boats being repaired. Proximity to the boat harbor area is a convenience for customers but certainly not a necessity. Compared to ship repair, ship construction is more dependent on rail and freeway connections for delivery of materials and/or shipping

of product. Construction of small boats generally occurs on land so a waterfront location may only be necessary for testing boats or parts.

Obviously, space is a requirement regardless of where the work occurs.

Bellingham has three major boat repair and construction companies; Weldcraft at Squalicum Harbor, and Uniflite and Fairhaven Shipyard at South Terminal.

Discussions with these companies did not reveal any significant benefits to be derived from consolidating boat construction and repair activities in one area or location. However, both Uniflite and Weldcraft indicated a need for additional space. All sub-areas have some potential for boat repair or construction activities.

7.4 Marinas and Mooring Areas

Pleasure boat moorage was discussed under recreation. Requirements for commercial vessels are similar. Deep water is usually not necessary. Consolidation of commercial moorage and fish processing activities in one location appears to offer some benefits. Potential benefits are discussed in Section 7.8. Commercial boats require dry storage for nets and other equipment. Parking is a requirement for both pleasure boats and commercial crews. Parking associated with commercial crews is sometimes long term and conflicts can arise when commercial and recreational parking are shared. The amount of existing and planned commercial moorage at Squalicum appears adequate for present needs. South Terminal is a potential location for additional moorage.

7.5 Tug and Barge Companies

The main requirements are adequate tug and barge moorage space, water depth and parking for tug crews. Bellingham Tug and Barge's location in the Whatcom waterway is adequate for existing operations. However, automobile parking is a problem. There are no known plans for additions to tug and barge operations in Bellingham. Therefore, there appears to be no necessity for locating additional tug and barge space elsewhere.

7.6 Pulp and Paper Mills Which Require Water Transport

There is only one pulp and paper mill in Bellingham, Georgia-Pacific, and it is extremely doubtful that any other wood products company would consider a pulp and paper mill on the Bellingham waterfront. Georgia-Pacific requires shallow and deep draft pier space, a significiant fresh water supply and both rail and truck (freeway) service. The location of G-P's plant next to Bellingham's downtown creates some problems for both the City and the Company. Given the Company's capital investment in its plant and its importance to the City's economy, it appears that the most reasonable approach would be for both to continue a friendly working relationship with frequent communication as to problems and plans. In general, the Company's operations are water-dependent, but some of the major space consuming elements of their operations such as retail lumber and part of their log storage are apparently non-water-dependent.

7.7 Lumber and Plywood Mills Which Require Water Transport

Mills sometimes receive logs and ship finished products by way of water transport systems. In these instances, deep draft moorage could conceivably be required. Lumber mills also make significant use of truck and rail transportation. The only water-dependent lumber and plywood mill in the study area is Mt. Baker Plywood, which is located in the Squalicum sub-area, north of the City Limits. R.G. Haley, which is located south of North Terminal, is not considered water-dependent. All of the sub-areas offer some potential for a lumber or plywood mill.

7.8 Fish Processing Plants

Fish processing requires unloading space for fishing boats or tenders and loading space for shipping product. Bellingham Cold Storage requires deep draft pier space for some of its operations. Some fish processors in Bellingham operate seasonally and generate a significant parking demand during summer months. Fish processors may require both cold and dry

storage. Truck and rail service is utilized extensively for shipping product. In talking with several fish processors in Bellingham, it appears that there may be some advantages to consolidation of fish processing activities within a rather limited area near the commercial boat harbor. There appear to be possibilities for joint use of unloading facilities, storage and shipping facilities. If nothing else, it could reduce cross bay boat traffic to unloading piers and cross waterfront truck traffic to cold storage facilities. It is for these reasons this alternative is discussed for the Squalicum sub-area.

7.9 Sand and Gravel Companies Which Require Water Transport

This industry requires barge unloading facilities and outdoor storage. It generates significant truck traffic. In Bellingham, the Olivine Company is similar in some respects to a sand and gravel operation, although it is presently non-water-dependent. Builders Concrete has the only water-dependent sand and gravel operation within the study area. The Whatcom sub-area has the major potential for sand and gravel operations. The South Terminal area is probably impractical for a sand and gravel operation at the present time due to limitations on bulk storage space.

7.10 Petroleum Handling and Processing Plants Which Require Water Transport

Petroleum processing plants have not been examined in any detail since there are presently none within the study area; and there are no known plans to locate Alaskan oil related facilities within the City. There are several petroleum distributors within the study area but only the Chevron distributor on Whatcom Fill is water-dependent. The distributors require storage space and generate a moderate amount of traffic with their delivery trucks. Almost any of the sub-areas could satisfy the requirements for an oil distributor but the Whatcom area appears to offer the best potential for water deliveries. A limited number of gas and diesel sales facilities exist and are desirable within the Squalicum harbor area.

7.11 General

Employee parking is always a requirement for industry and existing problems have been noted within the study area. Other general requirements include utility services, such as electricity, sewer and water. The major user of utilities in the study area is Georgia-Pacific which has its own water line from Whatcom Lake and will be developing its own industrial waste treatment facilities. The Bellingham Cold Storage complex is also a significant user of electricity.

CHAPTER 11

DEFINITION AND ANALYSIS OF ALTERNATIVES

1. INTRODUCTION

Two alternatives have been defined for each sub-area based upon the approach, limiting factors, and planning considerations outlined in Chapter 10. The discussion which follows provides an overview of the alternatives as well as a general outline of the major problems and potentials associated with each. A more complete rationale for the recommended alternatives is presented in Chapter 12.

Neither the definition nor analysis of alternatives has included any detailed examination of economic and demand factors which must eventually be considered. Except where there are definite environmental constraints, the amount of fill shown in the various alternatives is based upon amounts considered to be realistic and reasonable maximums in the long term.

2. SOUTH TERMINAL

2.1 General

In both alternatives (Figures 20 and 21) there would be no change to existing Port waterfront park which is located next to the Fairhaven Shipyard. In both alternatives a pedestrian trail is shown south from the Port park along the edge of the City's sewage treatment plant to a small park area at the south end of the tidal pool. No major shoreline development is recommended south of the sewage treatment plant due to potential adverse environmental impacts on this environmentally important area (see Chapter 10) and existing residential development.

Neither alternative offers the amount of expansion space desired by Uniflite. There appears to be no significant expansion space possible contiguous to the existing plant. Such expansion space would be useful to increase manufacturing capability and provide additional on-site parking for employees. Uniflite may eventually have to make a choice between split plants or a single large contiguous area at a different location. The company was classified as water-dependent because all boats manufactured at the plant are water tested. However, it may be that this testing phase could be conducted from a relatively small waterfront site several truck miles from the main plant. Regardless of Uniflite's decision, light industrial use of the Uniflite site appears to be the optimal use of the land.

In both alternatives the area east and south of the existing tennis center is shown as mixed residential-recreational; the former Wright Brothers Shipyard is shown as industrial; the railroad right-of-way is not changed; the existing Port owned and developed boat launch is retained; Padden Creek, south of Harris Avenue, is shown as a recreational right-of-way; and the City's proposed arterial improvements are included.

2.2 Alternative 1 (Figure 20)

Primary emphasis on public access-recreational use of waterfront with secondary emphasis on Port-industrial use. Padden Creek mudflats would be protected and incorporated into recreational development. Port activities would be restricted to the area west of the existing condemned pier. The condemned pier could be restored and utilized for commercial-recreational purposes. A pleasure boat marina could be developed east of the same pier, protected by a floating breakwater. A new fill is shown outboard extending northward of Uniflite. This fill could be used as expansion space for Uniflite. The existing fill areas south of Harris, across from the marina, could be developed either for light industry, commercial or multi-family residential use, although mixed recreational/commercial use is shown. This alternative is based upon the Fairhaven Plan by Architect James Zervas. (43)

The major advantage of this alternative would be its relationship with the Fairhaven Business District and the added recreational amenity for local residents. It is likely that a recreational development would induce commercial development to extend from Fairhaven along Harris toward South Terminal.

The mouth of Padden Creek offers recreational potential under any alternative. In this plan, the existing mudflat would be retained and possibly upgraded with edge treatment and vegetation to improve visual appearance and biological productivity.

Limited expansion space would be provided to Uniflite but the amount which would be economically feasible to develop on fill would probably not be sufficient for their long-term needs. The outboard side of any new fill adjacent to Uniflite could be reserved for recreation/public access, but there are significant design problems with regard to a Uniflite boat launch, security, and the barrier presented by the railroad bridge

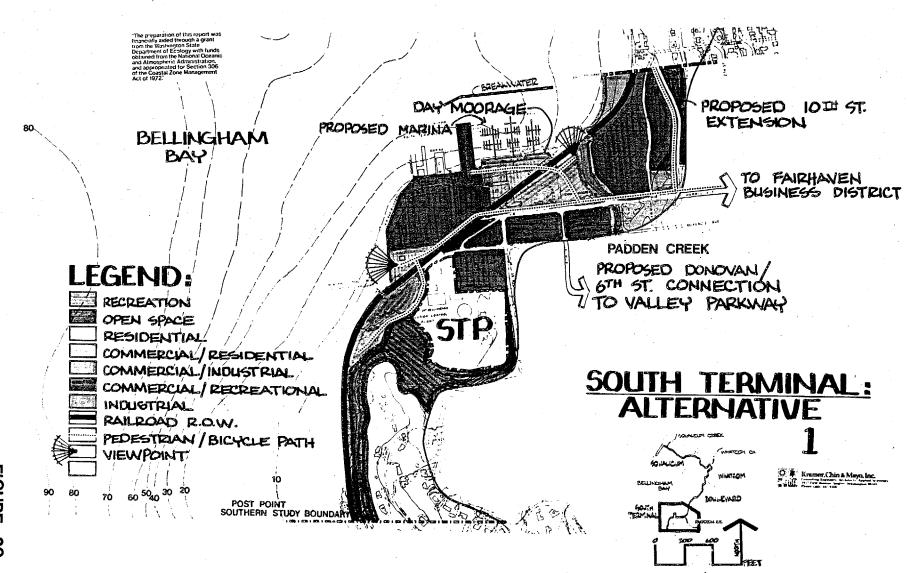


FIGURE 20

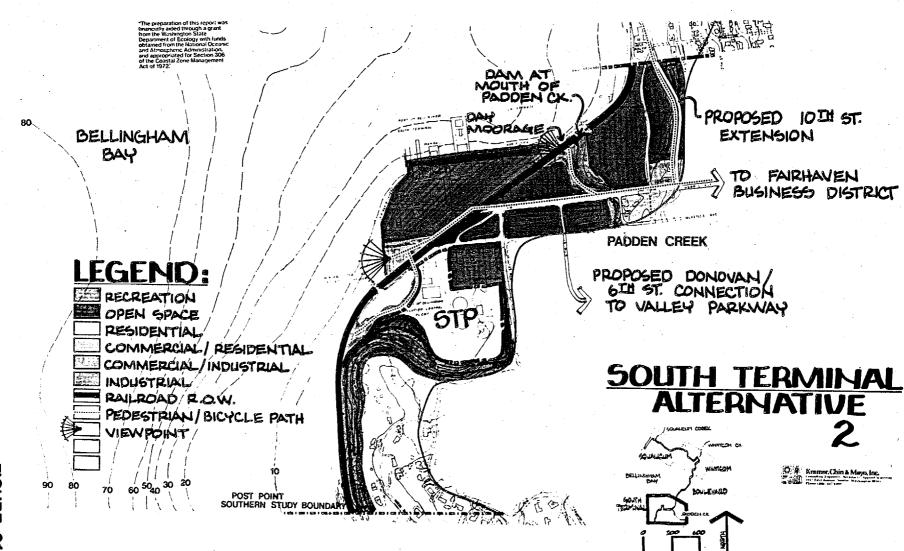


FIGURE 21

and Padden Creek. A pedestrian bridge over Padden Creek to the boat launch could be one solution but could cause even more problems at the boat launch. One problem with any fill in this area is the depth of water.

With a potential reduction of industrial activity, the amount of traffic generated through Fairhaven would probably be reduced and/or controlled. However, this would depend on the amount of traffic generated by the recreational facilities. A floating breakwater could probably be developed that would be suitable for this location but additional feasibility and design study would be required. If the Squalicum Harbor expansion project is realized then the need for additional marina space is questionable. In addition, the cost of developing and maintaining the remainder of the recreational space would have to be supported by the marina operation and/or commercial leases. The economic feasibility of Alternative 1 appears questionable.

2.3 Alternative 2 (Figure 21)

Primary emphasis on Port operations-industrial use with secondary emphasis on public access-recreational use. The mouth of Padden Creek could be partially filled to increase space for either recreational or industrial activities. In either case, a recreational right of way along the creek to the bay could be maintained. There could also be limited filling in front of Uniflite if it improved provisions for public access. Most of the coastal zone property west of Padden Creek would be utilized for industrial purposes except that limited pedestrian/bicycle access would be maintained throughout the area particularly along Harris Avenue and Padden Creek. Three sub-alternatives have been identified including Alternative 2a - Deep Water Port, Alternative 2b - Ferry/Visitors Terminal and Alternative 2c - Fish Processing Center.

In general, industrial emphasis in this area would generate more heavy traffic than Alternative 1. However, the City's proposed connection to the Valley Parkway utilizing 6th Street and the proposed 10th Street extension south to Harris could mitigate some adverse impacts. The activity relationship with Fairhaven might not be quite as strong as with Alternative 1 but the visual relationship could be maintained

and some activities provided by developing viewpoints of interesting industrial activities and paths for pedestrians and bicyclists. There would not be as much public space as Alternative 1 which offers the greater recreational opportunities. On the other hand, the public development and maintenance costs for Alternative 2 would not be as great as Alternative 1.

The advantages of Alternative 2a - Deep Water Port are the natural deep water conditions at South Terminal, (requiring little, if any, dredging), the existing underlying soil conditions allowing the use of concrete piles (wooden piles are required elsewhere along the waterfront) and good connections to rail and freeway. A possible disadvantage is a lack of substantial expansion area particularly if the Port could attract containerized cargo companies. In addition, both the North and South Terminals share the on-going problems of nearby residential areas. Invariably a local resident may become disgruntled with noise, traffic or some other side effect of a deep water port facility.

Advantages of Alternative 2b, Ferry/Visitors terminal, are better connections to the freeway and less existing traffic congestion than the proposed North Terminal location. Also the North Terminal is a working deep water facility whereas the Port is not handling large ships at South Terminal due to the deteriorated structural conditions of the pier.

An influx of tourists to this area could be a mixed blessing for the Fairhaven Business District. The tourists could promote additional business in existing establishments but they could also promote additional development of an undesirable nature. The existing character of Fairhaven could change. In addition, significant short-term and long-term parking space would be required as well as an auto staging area for the ferry. None of this parking is considered visually interesting or pleasant.

Alternative 2c, Fish Processing Center, could attract many commercial boats to the South Terminal and this could be visually interesting. Power requirements could be significant and new cold storage would have to be constructed. The South Terminal location would appear to have all the advantages of the existing Bellingham Cold Storage area at Squalicum Harbor except that this area is separated from existing commercial boat moorage. This might not be an overriding disadvantage. Also, a commercial boat marina could be considered at this location, but this would involve similar problems to the pleasure boat moorage discussed under Alternative 1.

Fish processing is a relatively labor intensive and seasonal industry. Therefore, unless properly planned, this alternative could generate parking problems during the summer months.

Some of the economic questions which need to be answered for this alternative include the amount of fish processing space required as a result of forecasted increases in salmon harvest from the proposed new salmon enhancement facilities in the region, and the effects of the new 200 mile limit. Other issues to be addressed include the advantages of concentrating fish processing near the existing harbor and the amount of expansion space which might be available or possible near Bellingham Cold Storage.

The partial fill of the Padden Creek mudflats depends upon the potential adverse impacts on natural systems and the justifiable need for additional space. Based upon information currently available, there appear to be no overriding environmental reasons for prohibiting partial fill as long as public access and strict design controls are maintained. Fill would represent a loss of some biota inhabiting the mudflat community (although this mudflat apparently does not support a significant community), but it does not appear that this mudflat has significant importance to the Bay. With either no fill or partial fill of the mudflat, a low dam at the mouth of the creek might be considered to create a continual tidal pool, a modified natural environment which would provide a more pleasant recreational space.

BOULEVARD

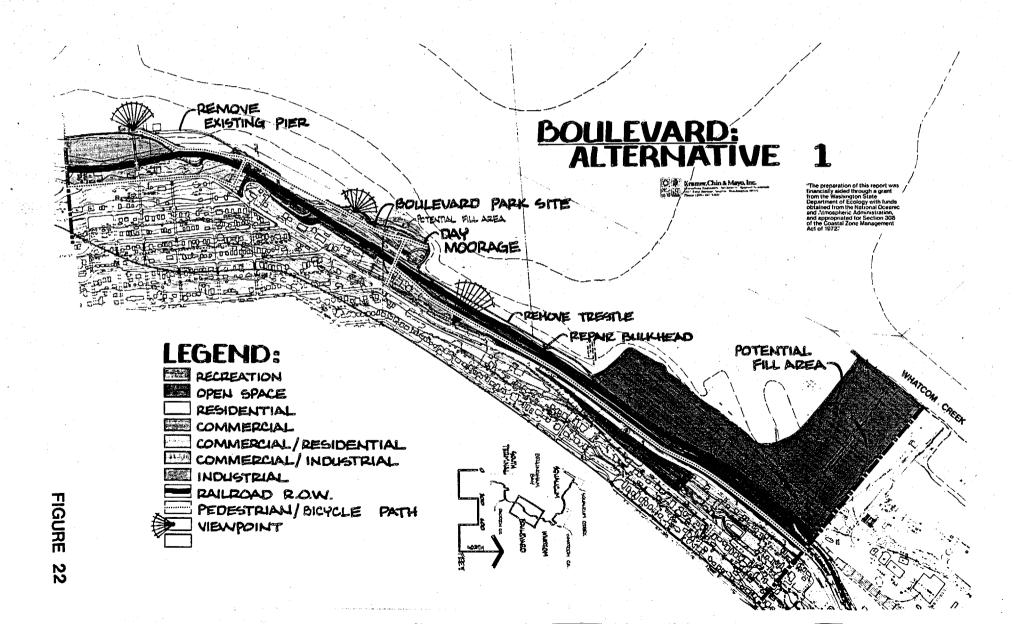
3.1 General

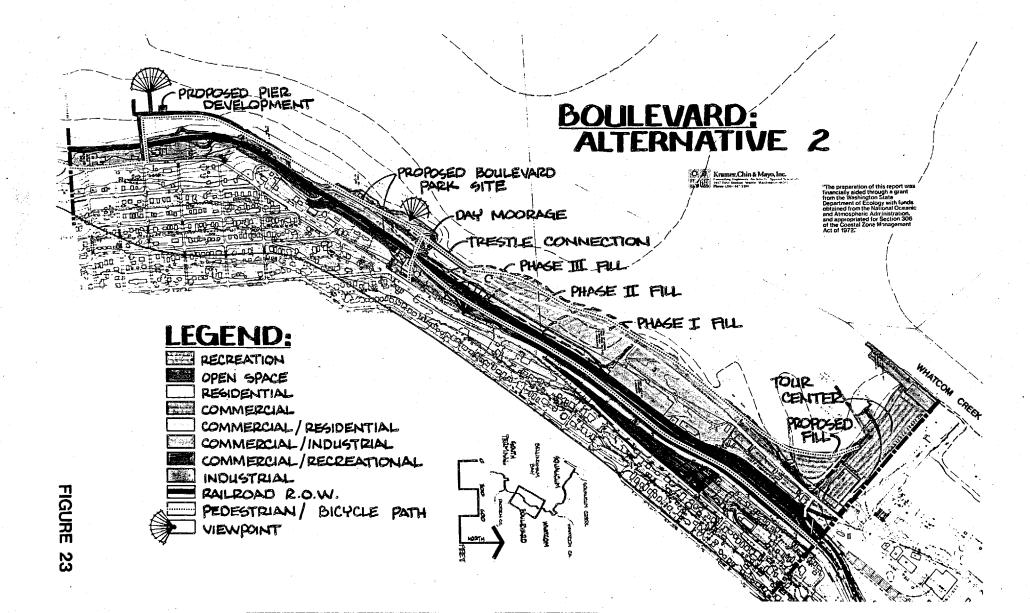
In both alternatives (Figures 22 and 23), the current general form of the proposed Boulevard Park has been accepted as given. Existing residential use of the area between the park and Boulevard is shown in both alternatives. The railroad right-of-way is not changed except that the proposed use of one rail right-of-way near Boulevard Street is shown as a pedestrian/bicycle right-of-way in both alternatives.

3.2 Alternative 1 (Figure 22)

Emphasis on continued industrial activity on the north end of the sub-area with mixed recreational and residential uses in the mixed commercial and industrial activities on the south end. Alternative I could be envisioned with or without fill. Potential fill areas include (1) the corner area between the North Terminal and R.G. Haley Company; (2) the park itself; and, (3) the area south of the park. The Port currently operates the only deep water shipping facility in Whatcom County at North Terminal. Unless sufficient justification can be identified for relocation, the Port may operate at this facility for many years. Problems with this location include the congestion associated with being in the middle of the waterfront and adjacent to downtown, the lack of a direct connection to the freeway and the lack of significant expansion space. In addition, all piers in the northern end of the Bay have a rapid siltation problem caused primarily by sediment entering from the Nooksack River. The result is a need for relatively frequent maintenance dredging. A possible means of overcoming this problem is to extend piers offshore into deeper water. Although no specific alternatives or designs have been prepared, this is an option which should be explored if the Port decides to continue deep water operations at North Terminal. The Haley and Brooks properties and the potential fill area between these properties and the North Terminal offer possibilities for Port expansion. In the event that the Port ever decided to abandon the North Terminal, Georgia-Pacific or another water-dependent industry might make use of the area.

Depending on the type of industrial activity in the Port/Brooks area, it would probably be advantageous to maintain a definite buffer between the industry and park uses by not filling adjacent to the railroad between the present southern edge of the Brooks property and the northern edge of Boulevard Park. However, the possibility of increasing the existing park and recreational space by fill should be considered. Fill could be integrated into the proposed design of the park's northern waterfront area and could be coordinated with improved access to the water edge. The rehabilitation of the trestle between the two park waterfront land areas is recommended in both alternatives for its contribution to the recreational and aesthetic experience. Fill by the trestle or next to the southern park land area is not recommended for similar reasons.





Private property south of the park consists of a condemned railroad pier and several non-water-dependent industrial activities. The eventual use of this area could include either rehabilitation of the railroad pier for filling this area for mixed commercial/industrial uses as shown on Figure 22. The problems with developing water-dependent industry on fill south of the park include potential conflicts with the park, lack of automobile access and the difficulty of bringing boats into this area without significant dredging and modification of the shoreline. Expansion of Uniflite north onto the fill could be explored but expansion into the Reid Boiler Works area is limited by the topography. The railroad pier might be expensive to rehabilitate but it offers unique potential for recreational (walkways, viewpoint, fishing pier and day moorage for pleasure craft) and commercial (restaurants and shops) activities.

3.3 Alternative 2 (Figure 23)

Emphasis on a waterfront tour center at the north end with related commercial, recreational and residential activities to the south, recreation and residential in the middle and recreation and commercial to the south. The park area would again be developed as proposed and the area south of the park would be designated for mixed commercial and recreational uses. The concept of Alternative 2 would be to have a public oriented focus to the entire sub-area with more active commercial uses at the north end (related to a Tour Center) and more passive uses in the center (related to Boulevard Park) and more active commercial uses in south (related to the railroad pier). The advantages of the North Terminal as a ferry-tour center include potential use of existing pier facilities (including the rail-chemical barge unloading pier), adequate space for parking and staging, and proximity to the downtown business district (ferry passengers are also potential downtown shoppers). The downtown area is more congested than South Terminal but this may not be a major problem, and ferry related traffic would probably not coincide with peak morning and afternoon traffic.

The ferry terminal would utilize space presently utilized by the Port's deep water operations. These operations would continue if the ferry terminal becomes a reality, but the space requirements for parking and staging would reduce the Port's flexibility at North Terminal. Therefore, as with Alternative 1, filling the corner area between North Terminal and R.G. Haley is an option that should be given serious consideration. In the long term it might be desirable to shift ferry parking to a new fill.

The R.G. Haley and Brooks properties could be developed with commercial and residential uses with the greatest concentration of commercial at the north end and residential uses sited toward the hillside near the railroad tracks. To provide access, Cornwall Avenue could be extended into this area. The location of rails and movement of trains could present a serious design problem for this entire concept. With Alternative 2 it makes more sense to somehow connect the Brooks property to Boulevard Park. This could be accomplished either by restoration of the existing trestle or by fill. If fill were used, the width would determine the design and use possibilities.

There could be a narrow fill just for recreation/public access or a wider fill for additional commercial and recreational uses. The fill could be implemented in phases as additional space is required. As with the existing area to the north, there are potential problems with the railroad tracks. Access could be provided onto the fill via Cornwall Avenue with a cul de sac at the end. A continuous street connection from North Terminal to the park is considered undesirable due to traffic impacts on existing and potential residential uses and park activities.

Regardless of what happens to the north, it may always be desirable to maintain some open water space between the passive Boulevard Park and more active areas. Therefore a no fill zone is shown on Figure 23. The major problem associated with the pier proposal is the cost associated with rehabilitation. This rehabilitation could be a joint public-private venture but it would still be expensive.

Under this alternative the railroad pier south of the park would be rehabilitated for recreational/commercial use. A pathway south of the park becomes very attractive due to the potential for a continuous path from North Terminal to South Terminal. The pier could include shops, restaurants, public fishing and a day moorage. A pedestrian/bicycle path could be developed south from the pier to Fairhaven and South Terminal along the 10th Street right-of-way. Land use upland of the pier could also include commercial activities with parking provided both for those activities and the pier.

4. WHATCOM

4.1 General

In both alternatives (Figures 24 and 25), no changes are shown for the Georgia-Pacific pulp mill property between the North Terminal and Whatcom Waterway. The property adjacent to the Milwaukee Road yard appears to be a logical expansion area for rail yard activities although such activities could probably occur outside the City. The relocation of Burlington Northern's main line outside of Georgia-Pacific's pulp mill as suggested by Georgia-Pacific appears to be reasonable from a safety and circulation standpoint, but the significant cost of relocation is recognized. Perhaps relocation would be possible if Burlington Northern developed yard space near the Milwaukee Road yard outside of Georgia-Pacific, but this relocation has not been shown in the alternatives. In terms of any water-dependent expansion space required by Georgia-Pacific, it could be available either by relocating the non-water-dependent retail lumber operation out of the area, or filling the existing open space next to the waterway, or by developing the Whatcom sanitary fill.

The Whatcom Creek Park plan has generally been accepted as given for this study. However, there are two alternatives within the plan which deserve additional consideration. One is the proposal to install a partial dam at Roeder Avenue. The City's Shoreline Committee recommended against this proposal, but further study would be worthwhile. The dam could provide a more varied and aesthetically pleasant environment than the present tidal situation. The mudflats are not biologically productive in this area at the present time. Also, these mudflats are visually unpleasant at low tide. The other alternative concerns Citizens Pier presently owned and occupied by Puget Sound Freight. The Whatcom Creek Park Plan does not make a definite recommendation concerning demolition

or retention of this pier but it may be that retention and redevelopment for commercial use offers an important opportunity for increasing public access to the water. It is assumed that if the pier were developed commercially, a public viewpoint could be provided at the Bay end. This would allow public enjoyment and education concerning waterborne commerce and industrial activities in the Whatcom waterway. One problem with commercial use of the pier is parking. Modification of Roeder to one-way with angle parking in this area or use of property to the south of the pier for parking are possibilities but either or both would have to be coordinated with the City's proposed improvements to Roeder which begin at C Street and continue north to the City limits. Any new parking might also be used by Foss Tug crews. That Company indicated that finding adequate parking is a problem.

4.2 Alternative 1 (Figure 24)

Emphasis on continued industrial use of existing Georgia-Pacific and Whatcom fill areas and park use of Whatcom Creek area east of Holly Street with no new fill allowed in any area. A pedestrian sidewalk would be provided along C Street, with a viewpoint at the end in accordance with the Whatcom Creek Plan. The Central Avenue street end at Georgia-Pacific could be reserved for future public use in accordance with the Shoreline Committee recommendation (although Citizens Pier offers a more complete view of the waterway).

A restaurant would be permitted at the corner end of the existing Whatcom Fill on the I & J Waterway side in conjunction with dry boat storage. This restaurant would have an interesting view particularly if the proposed harbor expansion project is implemented.

Georgia-Pacific presently utilizes the Whatcom sanitary fill portion of Whatcom fill for dry log storage. The log storage operation at this location is non-water-dependent. All new Georgia-Pacific logs are received at the pulp mill site where a determination is made as to storage location. Some logs are stored in the water (most of these are sold to others) and some on dry land. Dry land storage is split between the pulp mill site, and airport site (leased from the Port and shared with others) and the Whatcom fill site. Logs are trucked from the pulp mill to the fill

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and vice-versa. The weight of the logs appears to be an effective surcharge on the fill but it is also believed to be causing a water quality problem as leachates are not contained by the existing bulkhead. Log storage may not be the highest and best use of the downtown waterfront. Many people probably consider the log storage visually unattractive (although some may consider it more attractive than additional industrial development). A potentially desirable alternative would be for Georgia-Pacific to relocate this log storage off the City's waterfront and utilize this property for a more water-dependent purpose. However, it is recognized that this might necessitate Georgia-Pacific purchasing additional property which would probably not be as convenient as the sanitary fill location.

A no fill policy toward extending the Whatcom Waterway does not seem to offer any particular advantages except for limiting the amount of additional traffic and utility demands generated in this area. Designation of property near Holly Street for industrial use would be contrary to the predominant existing uses which are commercial. Also, a transition area of commercial uses appears to be beneficial both from the standpoint of the downtown and adjoining residential areas and the future Whatcom Creek Park. If a no fill policy is adopted, there could be the additional need for industrial space and this could not be met in this area unless there were encroachment of industrial uses inland of Roeder. This would not be desirable from the standpoint of the park.

4.3 Alternative 2 (Figure 25)

Use of fill to extend Whatcom fill, continued industrial emphasis
of both Georgia-Pacific and Whatcom Fill, park emphasis near Whatcom
Creek east of Holly Street and a commercial transition zone between GeorgiaPacific/Whatcom fill and the park. The existing Whatcom fill could be
extended seaward as demand dictates. In conjunction with any private
fill proposals, the City might negotiate to improve public access. With
industrial expansion space available seaward, there would be little if
any reason to expand industrial uses inland in this area. Therefore,
between Roeder and Holly, there could be more emphasis on recreational
type commercial uses (restaurants, taverns, retail shops). The combination
of Whatcom Creek Park and the Citizens Pier could provide a boost to

more pedestrian~oriented development along Holly Street although traffic and parking are ever present problems.

In the fill area, relocation of log storage may still be desirable as discussed under Alternative 1. The extension of fill beyond the sanitary fill would contain any existing leachate problem. Fill in this area could actually improve existing environmental conditions by containing the sanitary fill and covering polluted sediments. If fill is extended, the I & J Waterway side appears to have considerable potential for fish processing activities due to its relationship with the harbor expansion. Both sides of I & J might be suitable for fish processing with warehouse and cold storage provided on the Whatcom Fill. Any potential advantages at this location, such as availability of space, would have to be compared to the better freeway connections at Bellingham Cold Storage and at the South Terminal. Again, at the end of any fill extension on the I & J side of Whatcom Fill, a restaurant and public viewpoint would be attractive for the view both of activities on the I & J Waterway and of boats entering and leaving the expanded area of the harbor. Additional fill area could also provide additional space for dry boat storage for which there appears to be an existing and growing demand.

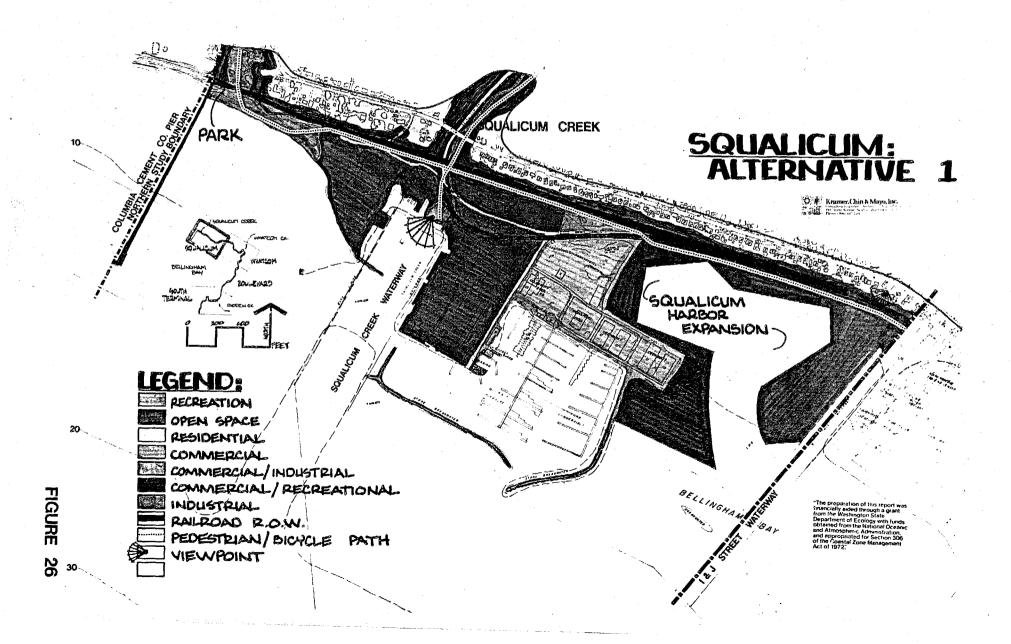
Unless carefully designed and constructed, additional fill could cause water quality problems. The source of fill would determine design requirements and the types of impacts encountered during development.

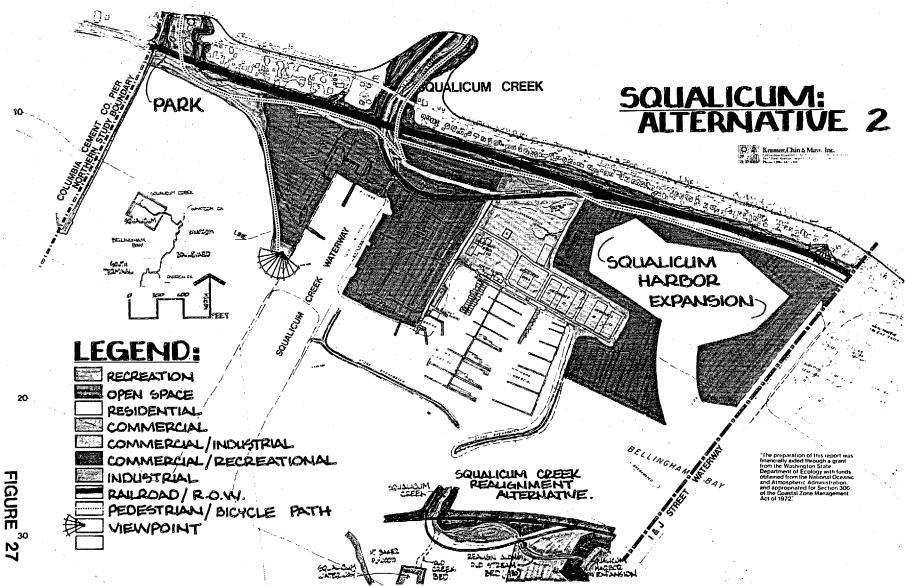
The relationship of the downtown/C.B.D. - government center area to the waterfront in this sub-area is not the primary focus of this study but it is recognized that there are considerable unrealized potentials pertaining to views, public access and activities. This study has attempted to discuss how public access might be improved within the coastal zone and a subsequent study will address how existing connections between downtown aeras and the waterfront might be improved.

5. SQUALICUM

5.1 General

In both alternatives (Figures 26 and 27) the Port's proposed Harbor Expansion Project has been accepted as given. Although the project is





still subject to design modifications, the site is the logical expansion space for the harbor and it appears that there is a need for the harbor to expand. Most of the permits necessary for construction have already been acquired and the only major remaining obstacle is financing. The stylized configuration of the harbor expansion as shown on Figures 26, 27 and 28 is a general representation of the current design concept for the land forms and breakwater as designed by Dr. Eugene Richey of the University of Washington's Hydraulics Laboratory. Dr. Richey is studying the harbor configuration as it affects tidal circulation and flushings characteristics.

No changes have been proposed for the existing Harbor area, although parking is sometimes a problem due to use of public parking by fish processors and commercial boat crews. Also, within the Squalicum sub-area, the joint City-Port improvements to Roeder Avenue are viewed as given. A brief review of the City's drawings indicates that the project is both reasonable and worthwhile. The project will not only allow for increased traffic capacity along Roeder but will also provide amenities such as pedestrian and bicycle paths and landscaping. No alternatives for the north and south connections of the Roeder improvement project have been discussed since these will be the subject of a separate study. Obviously, the improvements resulting from the study will be extremely important to traffic flow within this sub-area and to future development and usability of the areas near Whatcom and Squalicum Creeks.

At the northern end of the sub-area, the existing natural gravel beach area has been designated for recreational use and no other alternatives considered. This beach is the only site within the study area having a reasonably high potential for swimming activities. It is the only site with significant natural dry beach and, of biological significance, it is a surf smelt spawning area. The County's Little Squalicum Park located north of this beach offers potential in relation to the beach area. Automobile parking could be provided at the park with "pedestrian only" connections to the beach area.

5.2 Alternative 1 (Figure 26)

Harbor emphasis on eastern half of the sub-area, maintain existing industrial uses at Bellingham Cold Storage (BCS) and Mt. Baker Plywood, develop existing BCS space west of Squalicum Creek for park use, and preserve gravel beach north of Mt. Baker for recreation.

Bellingham Cold Storage and its tenants appear to require additional space for expansion. Without any fill, existing warehouse and cold storage space for fish products could be expanded by relocating the non-water-dependent Bellingham Frozen Foods (BFF) Company out of the BCS compound. BFF is a vegetable processing operation with a significant payroll. The firm processes vegetables from both Whatcom and Skagit Counties. An equally or more efficient location for this plant and associated cold storage might be found at an alternative location. The other non-water-dependent space is consumed by fuel distributors east of Roeder Avenue. These distributors could probably find equally efficient locations off the waterfront. Obviously, BFF and the oil distributors have investments in their current locations which would have to be considered in any BCS expansion plans. In addition, this option would not provide any additional pier space.

Mt. Baker Plywood is also seeking expansion space, and without fill the company has no real expansion capability at their present location. A potential relocation site would be the Whatcom fill although it is not known whether there are any potential efficiencies to be obtained by consolidating wood products industries into one general area.

The present BCS operation northwest of Squalicum Creek is limited to auto parking and warehouse use apparently because they have been unable to extend their leased property by fill. Alternative 1 would provide for park development of this BCS area and restoration of the natural environment at the mouth of Squalicum Creek. This park would allow a view of fish unloading operations at BCS south of Squalicum Creek. The park might somehow be connected to the upstream area of Squalicum Creek next to Squalicum Way. However, crossing the streets and railroad(s) in this area could be a problem. In addition, since parking is already a problem at BCS, it couuld also be a problem at the park. The need for a park at this location, given a proposed park west of Mt. Baker Plywood, might be questioned.

The Columbia Cement Pier would represent an opportunity for public access except that it is privately owned, utilized for industrial activities and there are liability problems associated with any public use. Extension of the pier for industrial purposes could save the company money in terms of dredging costs. However it could have adverse aesthetic impacts on the proposed park.

5.3 Alternative 2 (Figure 27)

Harbor emphasis on eastern half of sub-area, continue industrial use of BCS and Mt. Baker areas, expand BCS area northwest of Squalicum Creek with fill, expand Mt. Baker area with fill, preserve gravel beach north of Mt. Baker for recreation. A fill to expand the BCS area northwest of Squalicum Creek could extend to the inner limit of the waterway. The mouth of the Squalicum Creek could be protected and might be upgraded to improve conditions for fish migration, and could also be landscaped for appearance. A pedestrian path might be provided along the western edge of the creek with an elevated viewpoint for observation of industrial fisheries activities although this is not shown in Figure 27. The fill at the mouth of Squalicum Creek should not represent a significant adverse impact on the natural environment.

Fill could also be allowed at the Mt. Baker site extending to a point at the inner harbor line with a pedestrian path provided along the inside (western) face of the fill and a viewpoint at the point.

The inside or western face of Mt. Baker could be expanded but definite limits would have to be placed on the extent of fill in order to protect the recreation beach. In addition, this fill might be allowed only if Mt. Baker relocated and the space utilized for additional fish processing, or if Mt. Baker planned to use the space for expanded manufacturing and not log storage. Any existing fill activities or encroachment west of Mt. Baker should be stopped immediately unless proper permits are obtained.

Two sub-alternatives have been considered in conjunction with Squalicum Creek (see Figure 26). Alternative 2a would involve relocating the creek to its former channel east to the Squalicum Harbor Expansion area. Alternative 2b would involve relocating the channel west between Mt. Baker and

Roeder to the proposed natural beach area. Both of these proposals would require considerable additional study to determine feasibility. Either Alternative 2a or 2b could provide the benefit of a continuous industrial space around the Squalicum Waterway. Alternative 2a has an additional potential benefit of improving water circulation within the proposed Squalicum Harbor expansion. Relocation could also block passage of fish attempting to migrate upstream particularly if water quality in the boat harbor was poor due to domestic wastes, oil and grease, and possibly other pollutants. Alternative 2b could provide a definite edge and buffer to the gravel beach park area on the north and industrial area on the south. The new creek right-of-way could be developed with paths leading to upstream areas of the creek. The creek water might affect water quality by changing salinity or adding silt to the gravel beach. As previously noted, further studies would be required before serious consideration of either alternative could be given.

RECOMMENDATIONS

SECTION IV

CHAPTER 12 RECOMMENDATIONS

1. INTRODUCTION

The recommendations in this chapter are based upon pertinent data concerning Bellingham Bay and the City's coastal zone, including (1) history of development, (2) existing environmental conditions, (3) land use considerations, (4) interviews with major companies on the waterfront, (5) interviews with public officials, and (6) direct field observations.

The methodology followed in arriving at these recommendations was to:

- O Determine existing water-dependent and non-water-dependent uses.
- o Determine current public and private development plans.
- o Determine constraints on future development.
- o Summarize relevant planning factors pertaining to potential coastal zone land uses and activities.
- o Identify developable areas based upon constraints such as the nature and water-dependency of existing uses, topography, etc.
- o Define alternatives based generally upon the use or non-use of fill, existing zoning/shoreline designations and planning factors as compared to existing conditions for potential land uses.
- o Conduct an analysis of the alternatives.

In determining which of the alternatives or which portions of each alternative would be selected as recommendations, additional considerations had to be made. First, the original objective of the study was to increase the city's focus on and public access to the shoreline while at the same time providing for limited expansion of industry. It is recognized that although the waterfront recreation and public space is highly desirable, there is also a need for some industries to have access to the water and that these needs may be equally as important as those of the public, especially in terms of Bellingham's economy.

Secondly, the City has only limited resources available for acquisition and development of public space and each expenditure of public funds for this purpose impacts the Bellingham tax payer initially for

capital improvements as well as on a continuing basis for operation and maintenance programs. Therefore, an important emphasis of the recommendations has been to maximize public access while minimizing financial impacts on the City. The recommended approach is for the City to work closely with the Port of Bellingham and the private sector by permitting reasonable and environmentally sound modifications or expansion to industrial and commercial waterfront properties, while taking advantage of any opportunities presented in these proposals for increased public access and use of the coastal zone. The City and the Port also may individually or collectively pursue selected actions and regulations which can promote and control development.

The discussion which follows begins with general recommendations which are intended to address the areas of concern identified in Chapter 9. Then there is a brief overview of recommended land use described from Post Point to the Columbia Cement Company Pier. Next are site specific recommendations for land use and regulations to control future development within the coastal zone. Finally there is a general discussion of actions which must be considered prior to and/or during implementation of the recommendations.

2. GENERAL RECOMMENDATIONS

Site-specific recommendations concerning the general areas of concern are presented in the form of land use recommendations and development regulations in subsequent sections. Specific problems and recommendations that address the coastal zone as a whole are presented below.

2.1 Water Quality

Concerns:

- There is no organized water quality monitoring program for critical areas (e.g. vicinities of Georgia-Pacific, sewage treatment plant outfall, Whatcom sanitary landfill, sewage pumping stations, creek mouths, waterways, and Squalicum Harbor).
- o Not all industries are connected to sewage treatment facilities.
- o Industrial runoff is not controlled.

Recommendations:

o Establish a water quality monitoring program for critical areas.

- This could be conducted by Huxley College and managed by the City.
- o Establish an enforcement procedure to assure that water quality standards are adhered to. Provide fines and penalties for acts detrimental to water quality. Coordinate this program with the Washington State Department of Ecology.
- o Control, and in some cases treatment, of industrial runoff should be part of any drainage utility that is enacted.
- o Further sanitary landfill should not be permitted in the coastal zone.

2.2 Air Quality

Concerns:

- Ambient air quality standards for particulates are being exceeded by Georgia-Pacific and Columbia Cement. Ambient standards for ${\rm SO}_{\bf v}$ are also exceeded by Georgia-Pacific.
- O Dust from sand and gravel operations (open storage of fines) is a known problem.
- Odor problems exist in the vicinities of Georgia-Pacific, fish processors, and the sewage treatment plant.

Recommendations:

- o The City should publicly and strongly support the efforts of the EPA and NWAPA regarding compliance with air quality standards.
- o An ordinance banning the open storage of fines from sand and gravel operations is necessary.
- o The City should require industry to control odor problems.

2.3 Noise

Concerns:

- o High noise levels exist in several locations.
- o Quantitative data are lacking concerning those locations and levels.
- o Bellingham has no noise control ordinance.

Recommendations:

o The City should establish a noise ordinance based on City needs and provide the capabilities to enforce it.

2.4 Flora and Fauna

Concerns:

o Landfill in the recommended areas has the potential for some adverse impacts on flora and fauna.

Recommendations:

o o Adverse effects to marine life could be mitigated by the reestablishment of habitats similar to those which were covered
with fill. An alternative approach would be to establish a
new type of habitat (e.g., artificial reef) which would increase
species abundance and diversity in the general area.

2.5 Non-Water-Dependent Shoreline Uses

Concern:

o A significant amount of waterfront industrial land (Figure 19) is being utilized by firms which have no dependence upon the water or waterfront access.

Recommendations:

The City and Port of Bellingham should work together to encourage the relocation of non-water-dependent uses now in the coastal zone. Final use of landfill areas must be consistent with the City's Comprehensive Plan. Lesser interim uses of the fill may be permitted provided that they are consistent with the existing and recommended shoreline policies and regulations.

2.6 Land Availability

Concerns:

Land availability is a constraint to industrial expansion.

Recommendations:

o This point is addressed as part of the land use recommendations.

2.7 Dredging

Concerns:

- o Dredging is necessary in the Whatcom Creek, I & J Street, and Squalicum Creek Waterways in order to maintain navigable waters.
- o Sediments in the Whatcom Creek Waterway have a high mercury content.

Recommendations:

- o Dredging spoils from the I & J Street and Squalicum Creek Waterways should be disposed of at any of the recommended fill areas.
- o Mercury laden dredge spoils from the Whatcom Creek Waterway should be disposed of behind an impermeable dike at the recommended extension of the Whatcom fill in order to minimize impacts on the environment.

2.8 Unstable Land Conditions

Concerns:

- o Contaminants from the sanitary landfill portion of the Whatcom fill are presently leaching into the Bay.
- o Portions of the shoreline edge are being eroded (e.g. from the northern edge of Boulevard Park to the R.G. Haley property).

Recommendations:

- o The recommended fill extension seaward of the existing sanitary landfill should relieve leachate problems provided new fill is contained within an impermeable dike.
- o Existing deteriorated bulkheads should be repaired.

2.9 Road Transportation

Concerns:

- o There are road congestion problems due to freight handling and employee traffic.
- o In the central waterfront area truck routes are indirect and conflict with downtown Bellingham arterials.
- o There is a nuisance problem associated with truck traffic at night on residential streets.

Recommendations:

- o Improvements to the public transit system and road system will be recommended at the completion of ongoing transportation studies. Timely implementation of those recommendations is suggested with particular attention given to truck routes.
- o Truck traffic on residential streets should be restricted to daylight hours.

2.10 Parking

Concerns:

There is a general lack of organized employee parking among waterfront industries.

Recommendations:

- o Joint industrial-recreational parking should be encouraged.
- o Plans for new development should include adequate employee parking.

2.11 Marine Traffic

Concerns:

- o The Squalicum Harbor expansion and Alaska Ferry terminal, if established, would increase marine traffic.
- o There are no designated shipping lanes within the inner harbor.

Recommendations:

- o Shipping activities should be restricted in the vicinities of small craft marinas.
- Existing waterways should be retained.

2.12 Aesthetics, Culture and History

Concerns:

- o There is an abundance of debris and trash along the shoreline.
- There are many dilapidated, unused structures along the waterfront. Included are a small pier north of the Uniflite launching dock, vacant wood frame and concrete buildings at Boulevard Park, pilings at Boulevard Park, a log haul boom at the north end of Boulevard Park and a trestle and pilings south of the R. G. Haley Frank Brooks area.
- Many industrial sites are sorely in need of maintenance (litter removal, painting, etc.) and landscaping.
- o View corridors may be blocked by new development.
- o Lack of emphasis within study area to Bellingham's early culture and history.

Recommendations:

o An organized maintenance program of beach and shoreline areas should be established. This would include the cleaning up of debris and the removal or rehabilitation of dilapidated,

unused structures.

- o Industries should be encouraged to clean up and landscape their sites. Landscaping may also serve as a noise and visual barrier.
- o The following view corridors should be maintained:
 - 1) From the Fairhaven business district down Harris Avenue to the waterfront.
 - 2) From the Fairhaven business district northwest to the waterfront.
 - 3) Residential views from existing apartments and homes in the Boulevard sub-area.
 - 4) From the proposed trail within the railroad right-of-way to the waterfront (particularly in the area south of Frank Brooks' property).
 - 5) Views to the water from the central business district (particularly along Central Avenue and Bay Street).
 - 6) Views to the water from the Lettered Streets neighborhood (particularly along C Street and H Street).
 - 7) Residential views from existing apartments and homes in the Squalicum sub-area.
- o City should establish sign ordinance which would control size, type and placement of signs.
- o Bellingham's early culture and history should be considered in all site planning and design efforts. Architecturally significant structures should be identified, preserved, and rehabilitated. These structures plus old sailing vessels, rail cars, trolley cars, and replicas of same could add an important perspective to Bellingham's industrial history. An equally important facet of the waterfront is its relationship to Bellingham's cultural heritage. This cultural heritage should also be emphasized.

2.13 Public Access

Concerns:

o Public access to the Bellingham waterfront is severely limited.

Recommendations:

- o This point is addressed as part of the land use recommendations.
- 2.14 Future of the Port of Bellingham and Waterfront Industry

Concerns:

o The economic future of these entities is not defined at this time.

Recommendations:

It is understood that the Port is pursuing a study concerning the extent of future demand on their facilities. Future economic analysis may be necessary to determine future Port and waterfront industry directions.

2.15 Waterborne Police and Fire Protection

Concerns:

o Increased waterfront activity will require increased marine police and fire protection.

Recommendations:

These services will have to be developed in the near future.

The possibility exists for a joint patrol-fire boat operation.

2.16 Coordination with County

Concern:

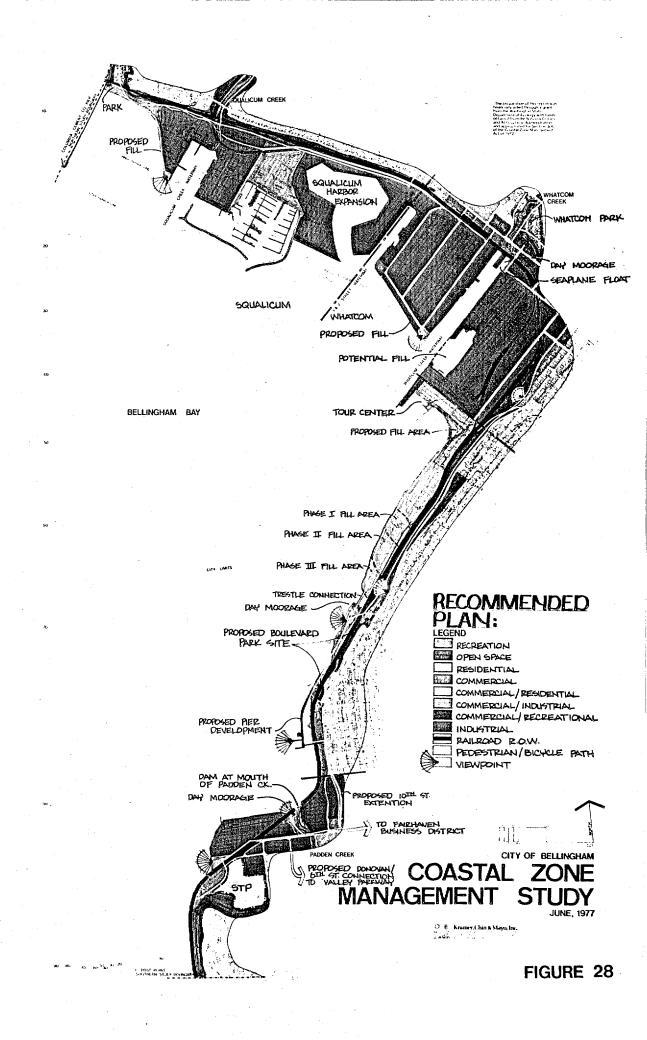
- The Port of Bellingham is the major land owner in the study area.
- o A portion of the study area is outside of the City's jurisdiction.
- Actions by the Port and/or the County may have significant impacts on the City's waterfront.

Recommendation:

- o Establishment of the suggested policies and regulations and implementation of the recommended plan should be closely coordinated with the Port of Bellingham and applicable Whatcom County agencies.
- 3. OVERVIEW RECOMMENDED LAND USES AND POTENTIAL FILL AREAS

The recommended land use within the Bellingham coastal zone is depicted graphically in Figure 28. In each of the four sub-areas discussed in Chapter 10, Alternative #2 was selected as the recommended land use (see Figures 21, 23, 25 and 27).

Beginning at Post Point and proceeding northward, no change is recommended between the Point and the southern end of the City's sewage treatment plant (see Figure 21). Adjacent to the sewage treatment plant, there is a tidal lagoon which is not only of biological interest, but also provides a focal point for a small park which could be developed on existing



City property south of the lagoon. Access to the park could be via a pedestrian trail along the eastern edge of the lagoon but this trail should be designed to protect both the lagoon and the marsh area to the east. A board walk could be used to help control foot traffic. At the north end of the lagoon, northwest of the railroad, is the Port's existing waterfront park which would remain as is.

The area between the Port's park and Padden Creek is recommended for industrial use. A specific use has not been recommended due to lack of definite information concerning growth potentials of private industry. This is true of most land use recommendations in this study, since additional economic information would be required to determine more exact needs and space requirements. Furthermore, the railroads either parallel or exist in close proximity to the shoreline throughout the study area and, while it is believed that the recommended land uses and the railroad can co-exist safely, it is also believed that considerable attention should be given to the railroad's relation to all proposed improvements and new public access.

The Padden Creek mudflat is recommended to be partially filled once a definite need for additional space has been identified. However, a linear park space should be maintained along Padden Creek on both sides of Harris Avenue. At the mouth of the creek a partial dam could be considered to provide a continual pond area adjacent to the recreational space. Another option would be to maintain a portion of the existing mudflats. This could be achieved by decreasing the elevation of the dam. An observation point at the mouth of Padden Creek would be desirable to allow a view of marine industrial operations at South Terminal.

The existing boat ramps west of the creek should remain, but the associated parking could be relocated off the waterfront onto undeveloped property to the south. Wherever the parking is located, the possibility of a joint industrial-recreational use of the parking area should be explored with a limited portion of the spaces reserved for recreational use at all times.

Northeast of Padden Creek, the Uniflite Company space is unchanged, as no contiguous expansion space has been provided (Figure 21). North of Uniflite, the coastal land above the railroad is recommended for commercial use. The commercial activities could be separate or related to the proposed rehabilitation of the old railroad pier. This pier could be developed jointly between public and private interests and could include

restaurant(s), shops, a public fishing pier and a day moorage for small pleasure craft. Joint commercial-recreational parking could be developed at the foot of the pier.

Leading north, the railroad pier will connect to the southern end of the City's proposed Boulevard Park (Figure 23). No changes have been suggested for the essentially passive nature that has been proposed for this park. Another small day moorage is suggested for the north end of the park. Additional study may be required to determine the feasibility of both of these day moorage facilities regarding water depth and possible requirements for breakwater protection. Some separation is recommended between the park and any development to the north in order to preserve the passive nature of the park from the more active proposed uses to the north. The land north of Boulevard Park and seaward of the railroad (area owned by R. G. Haley and Frank Brooks) is recommended for commercial/residential use. This area could be extended in phases to the south by fill as shown on Figure 30.

Again, moving in a generally northern direction, the commercial/residential use evolves into a purely commercial district related to the proposed use of the Port's North Terminal as a Tour Center. The Tour Center could include an Alaska Ferry Terminal, ferry service to British Columbia, charter boats, a floating restaurant, public day moorage and police-fire boat facilities. The area between the Tour Center and the commercial area is shown as a potential fill area for parking and could be used jointly.

Northeast of the Tour Center is an area designated for industrial use, including existing Port and Georgia Pacific properties (Figure 25). No changes are proposed here except that the water space within G-P's property along Whatcom Waterway represents a potential fill area.

The Whatcom Waterway should remain essentially unchanged with the one exception that Citizen's Pier be designated for commercial use with a public viewpoint at the end (Figure 25). The existing sea plane and day moorage for small pleasure craft should be retained. No specific changes are recommended for Roeder Avenue or Holly Street but traffic planning in this area should address the need for safe pedestrian circulation between Citizen's Pier and the proposed Whatcom Creek Park. No changes in land use are proposed for the Whatcom Creek Park since it

ecologically.

Regulations:

- o No fill should be allowed in this area.
- o There should be no development of the bluff that would remove vegetation or increase erosion. (Note: area of existing storm water line development should be revegetated).
- o There should be no development at the top of the bluff which could cause similar problems.
- o Fresh water impoundments should be maintained.

4.3 Tidal Lagoon (Sewage Treatment Plant)

Land Use: Limited recreational use of existing tidal lagoon and marsh.

Rationale:

- o Railroad is barrier to access on west side.
- o Lagoon is aesthetically pleasant and biologically interesting.
- o STP has no plans to develop this area.
- o Land is already in public ownership.
- o There is dry land available at the south end of the lagoon for a small park.

Concerns:

- o Tidal lagoon could be harmed by over development and use for recreation.
- o Marsh adjacent to lagoon could similarly be affected.
- o Tidal area seaward of railroad tracks is relatively important ecologically.
- o Any blockage to flow of water in and out of lagoon could be ecologically undesirable.

- o No fill should be allowed in this area.
- o Present rail bridge opening should be maintained.
- There should be no intensive park development or use of this area.
- Access for public should be provided inboard along southeast short of lagoon on a board walk type path.
- o Recreational activities which could be harmful to natural conditions in the marsh and lagoon should be prohibited.

- o Automobile access to proposed park area should be prohibited.
- o Tidal lagoon should be reserved for passive recreational uses only.
- o Any City plans for expansion of the STP should fully recognize the unique natural characteristics and public use potential of this area.

4.4 Port of Bellingham Waterfront Park

Land Use: No change from existing recreational use.

Rationale:

o The park appears to be a popular public area.

Concerns:

- o Expansion of park would encroach on industrial space.
- o Security problem between park and shipyard along western border.
- o Existing public access to the shoreline on west side of shipyard is highly desirable.
- Odors from Sewage Treatment Plant impact park.
- o Intertidal area is both aesthetically and ecologically important.

Regulations:

- Expansion of park seaward or into shipyard undesirable under existing and projected conditions.
- o No fill should be allowed in this area.
- o "No trespassing" signs should be posted and security fencing improved along western border of shipyard.
- o Public access to western border should be maintained.
- Sewage Treatment Plant should control odors within acceptable limits (difficulty in establishing "acceptable limits" is recognized).
- 4.5 Fairhaven Shipyard to South Terminal Boat Launch

Land Use: Industrial

Rationale:

o Park development, as suggested in Fairhaven Plan, would probably not be undertaken by the Port and it would be a significant financial load if the City were to undertake such improvements.

is recognized that this park has the potential of becoming an important focal point for downtown Bellingham.

The Whatcom fill area is recommended to remain in industrial use with limited public access to the end. A substantial area of industrial expansion is provided for out to the limit of the inner harbor line, although it is recommended that G-P relocate its dry log storage from the sanitary landfill off the waterfront and that the resulting vacant area be used for expansion of water dependent industry prior to any additional fill.

The Squalicum Harbor Expansion area is shown as currently proposed (Figure 27). In general, a concentration of pleasure boat moorage within the expansion area is proposed with commercial fishing boat moorage located within the existing moorage. One difficulty with this proposal is that several pleasure boat related uses and structures are located in the existing harbor. Eventually, however, a rearrangement of facilities may be desirable.

The area around the mouth of Squalicum Creek and the Squalicum Waterway is recommended for industrial use. However, any expansion of Bellingham Cold Storage (BCS) should be contingent upon relocation of the non-water-dependent Bellingham Frozen Foods (BFF) to a location off the waterfront. The BFF space should be used for expansion of fish processing facilities prior to expanding outside of the present BCS Compound.

The treatment of Squalicum Creek requires additional study prior to a final recommendation. The present alignment of Squalicum Creek is shown in Figure 27. There are potential benefits to realignment of the Creek either to the east or west as discussed in Chapter 11. Expansion space for industry is provided by designated fill areas at the mouth of Squalicum Creek and to the south and west of the present Mt. Baker Plywood area. If there is a fill at Mt. Baker, public access should be provided along the western face.

West of Mt. Baker, the existing gravel beach is to be protected and designated for recreation use with a connection to the County's Little Squalicum Park. However, industrial access will have to be maintained to the Columbia Cement Company Pier at the north end of the study area.

4. SITE SPECIFIC LAND USE RECOMMENDATIONS AND REGULATIONS

4.1 Definitions

This section presents recommended land uses and regulations for

- o There are more suitable areas for extensive recreational development within study area.
- o Need for substantial pleasure boat marina space at this location is questionable.
- o Water depth, rail and freeway connections at this site are optional for industrial use.
- o A favorable relationship with the Fairhaven Business District can be maintained with industrial emphasis at South Terminal if heavy traffic is routed around Fairhaven. Views of industry can be just as interesting as natural vistas.
- o Industrial emphasis at South Terminal need not have significant adverse impacts on surrounding residential areas if the Port maintains communication and responds to the concerns of these communities.
- o Industrial use can benefit the economy more than recreational use, yet need not be significantly harmful to the natural environment if proper controls and adequate surveillance are maintained.

- o Impacts of industrial traffic on Fairhaven and surrounding residential areas.
- o Impacts of noise on surrounding residential areas.
- o Visual pollution.
- o Parking impacts on surrounding area.
- o Vacation of some streets required for optimal development.
- o Public access to Bellingham Bay from Fairhaven area.

- o Connection to freeway from South Terminal must be improved prior to any new industrial development which would substantially increase truck traffic.
- o North-south streets may be vacated depending on City analysis of needs, but 4th and 6th Streets should be retained.
- o Noise impacts must be controlled by a City Noise Ordinance.
- o Parking must be provided for within the industrial area or by shuttle bus from outlying areas. Shared parking with the boat launch should be investigated. Parking should not encroach on residential or business districts.

- o There should be an overall design and landscaping plan for this area prior to substantial development. The plan should complement boat launch and Padden Creek improvements.
- o The design concept for the South Terminal area and other areas south of Harris Avenue should recognize the existing view perspective and view potentials from significant portions of the Edgemoor and South Hill neighborhoods. Therefore, the choice of colors and roofing materials are important considerations. In general the use of non-reflective roof materials should be stressed throughout the study area. Except for downtown, there are homes overlooking the entire waterfront.
- o Significant fill in this area seems neither necessary nor economically feasible. A limited amount of fill is acceptable for modification of the edge conditions for the selected industrial use(s).
- o A rip-rap type bulkhead and use of non-polluted dredge spoils are acceptable if approved by regulating agencies.

4.6 South Terminal Boat Launch

Land Use: Recreational Use. Retain boat launch function at this location but modify design to provide limited day moorage.

- o The launch appears to be popular.
- o Demand will probably continue in future even with provision of ramps at Squalicum Harbor.
- o Seems desirable to maintain a launch at southern and northern ends of City.
- o Entrance road could be designed in conjunction with linear park along Padden Creek.
- o Launch area could be modified to improve traffic flow.

- o Boat launch parking could be located off waterfront and shared with industry. (Peak hours of boat launch use and peak industrial parking demand do not coincide).
- o Day moorage could be provided in conjunction with launch to permit visits to Fairhaven.

- o Boat Launch should not encroach significantly on valuable waterfront industrial property.
- o Visual pollution.
- o Conflicts with existing railroad.
- o Traffic congestion.
- o Other design problems associated with the site.

Regulations:

- o If at all possible, boat launch parking should be relocated off waterfront to area south of Harris.
- o Parking should be shared with industry with a limited amount of parking reserved for the boat launch at all times.
- o The amount of day moorage should be limited to 5-10 boats.
- o Traffic flow in and out of the launch ramp area should be redesigned.

4.7 Padden Creek and Associated Mudflats

Land Use: Partial fill for industrial use and linear park development for recreational use along creek to shoreline.

- o The present mudflats have limited biological activity.

 However, additional study may be desirable before any
 final decision to fill is made.
- o Fill would provide expansion for industrial activity thus making this area more attractive for certain types of industrial development.

- o A linear park could be created under a joint public/private project in conjunction with the fill.
- o The park would provide a terminus for a path along the creek from Fairhaven Park.
- o The park could provide the educational opportunity to view marine industrial activities.
- o The railroad offers an existing boundary to the outward extent of fill.
- o The existing Port Park and the proposed Tidal Lagoon and Padden Creek Parks all offer public access and the opportunity for visitors as well as local residents to enjoy the waterfront.

- o Necessary to obtain a viable mix between industrial and park use.
- o Potential to enhance ecological conditions in park area and protect the resulting environment.
- o View of industrial activities.
- o Safety of public.
- o Conflicts with industrial operations.

- o Creek alignment should be maintained in generally the existing location.
- o Industrial use should be restricted to roughly western 2/3 of present mudflat.
- o Park design should provide for public safety by maintaining physical separation from industrial activities.
- o Safe public access should be provided along Harris Avenue to Port and S.T.P. tidal lagoon parks.
- o A safe pedestrian crossing of Harris Avenue should be provided at Padden Creek.
- o A gradual slope with appropriate landscaping to the edge of the creek should be provided in the design of the fill and bulkhead.

- o An elevated public viewing platform should be permitted.
- O Use of non-polluted marine dredge spoils from other than G-P area is acceptable for fill if approved by regulating agencies.
- o It is recommended that a low dam be considered at the railroad bridge to maintain a continual body of water in the park.
- o No fill should be permitted outward from the railroad tracks.
- o Except for creek and park, modify existing shoreline designation from Conservancy II to Urban II.
- o Fill should not be allowed until the need for additional space was highly justified.
- o The use of the fill should be water-dependent. This could include uses which are accessory to water-dependent uses and which will provide a suitable transition between the park along the creek and industrial activities to the west.

4.8 Uniflite

Land Use: No change from existing light industrial use.

Rationale:

- o Public access along the northwest edge of Uniflite presents difficult security and design problems.
- o Expansion of Uniflite to the other side of Padden Creek is possible but the creek should not be filled. Therefore, the area would not be contiguous.
- o Expansion to the north would be very difficult due to topography.
- o Expansion to the east is undesirable due to topography and existing development.

Concerns:

- o Parking.
- o Odor from fiberglass.
- o Visual Pollution.

Regulations:

- o Parking from any industrial use should not have a significant adverse impact on City streets. If and when Uniflite's parking demand becomes a problem for the Fairhaven area, the City and/or the Port should require Uniflite to provide additional employee parking.
- o No fill should be allowed in this area either seaward of the railroad or to the west covering the creek.
- o The western edge of Uniflite should be landscaped for buffering in conjunction with the park development.

4.9 Uniflite to Railroad Pier

Land Use: Change from industrial to commercial use.

Rationale:

- o Existing industrial uses are non-water-dependent.
- o It would be difficult to develop water-dependent industrial uses here without extensive changes to shoreline.
- o Commercial uses such as restaurants and shops could be developed in conjunction with rehabilitation of the railroad pier.
- o The northern portion of the area is suitable for joint commercial-recreational parking.
- o Private commercial development offers a form of public access to the shoreline at a limited cost to the City.
- o Residential use could block views and public access.

Concerns:

- o Coordination with development to the north.
- o Parking.
- o View blockage.
- o Pedestrian/bicycle access.
- o Connection to Fairhaven.

Regulations:

o There should be a general unified design concept established from North Terminal to Uniflite and to Fairhaven area.

- o Space should be reserved for future parking requirements in conjunction with railroad pier rehabilitation and development. This parking could be shared with upland commercial uses.
- o Provisions should be made for adequate public movement from pier along Taylor to 10th Street and along 10th south to Harris Avenue.
- o Some view blockage in this area appears inevitable, but the City should help minimize this blockage by negotiating with developers for optimal siting.
- o No fill should be allowed in this area.

4.10 Railroad Pier

Land Use: Rehabilitate unused railroad pier for commercial and recreational uses.

Rationale:

- o Rehabilitation could be a joint public/private project.
- o The pier is located in an aesthetically pleasant area.
- o The pier can connect to the park to the north.
- o The pier offers potential for restaurants and shops as well as public recreation, walking, viewing, fishing, day moorage, etc.
- o While rehabilitation would be costly, the pilings are in place which reduces the problems associated with obtaining substantial development permits. The project would require some replacement rather than all new construction.

Concerns:

- o Public safety.
- o The railroad (Burlington-Northern) owns the pier and plans eventually to demolish it.
- o The continuing maintenance responsibility for the pier must be determined if it is rehabilitated.
- o Design quality is particularly important.

- o Relationship to Boulevard Park.
- o View blockage.

Regulations:

- o No fill should be allowed in this area.
- o City should maintain sufficient control over pier to ensure high quality design and minimum view blockage.
- o Seaward expansion of pier should not be allowed.
- o 15-20 foot height limit for any construction on pier.
- o The City, the Port and/or a private developer should purchase the pier.

4.11 Boulevard Park

Land Use: Develop in accordance with current concepts for recreational use.

Rationale:

- o Existing concept will provide public access and recreational space on the waterfront.
- o Given constraints of existing development, space configuration seems reasonable.
- o Park can be terminus for a possible trail following a railroad right-of-way along Boulevard and State to downtown area.
- o If at some later date the park becomes overused and there is a need for additional space, then the western edge of the Park might be expanded by fill.

Concerns:

- o Expansion capability.
- o Edge design.
- o Traffic on Boulevard.
- o Separation from development to the north.

Regulations:

o Fill should be permitted at the northern end of the park but not at the southern end.

- o The extent of fill should be in keeping with surrounding land forms and should not extend past the existing 20-25 foot bathymetric contour.
- o Any future modifications to State Street in this area should consider necessary access to and from the park.
- o A space of approximately 400-500 feet should be maintained between the northern edge of the park and any development to the north.
- o The type of bulkhead used in conjunction with the fill will depend upon safe public access, park design and the desired edge treatment. A rip-rap bulkhead is unacceptable in the park.
- O Unpolluted marine dredge spoils are acceptable. The quality of fill is extremely important in a park setting with public use. If fill is proposed to be used to expand the northern end of the park, the existing Conservancy II shoreline designation should be changed to Urban II.
- o The existing trestle between the northern and southern park areas should be rehabilitated for public use in connection with the park.

4.12 Boulevard Park to Brooks Property

Land Use: Fill portion of area from north to south for mixed commercial/residential use, and retain recommended open-water space between fill and Boulevard Park.

- o Fill in this area should not cause significant adverse impacts on the environment.
- o Expansion area for residential and commercial uses may be desirable.
- o Present shoreline consists of a rip-rap bulkhead, the railroad tracks and a steep bluff. This severely restricts the use of this shoreline area for any purpose.

- o Fill could provide public access along shoreline to Boulevard Park from proposed Tour Center.
- o Access could be provided by extending Cornwall Avenue.

- o Relationship to Boulevard Park.
- o Conflicts with railroad.
- o Public access.
- o View blockage.
- o Parking.

- o The land uses proposed for the Brooks property to the north are active while the park is essentially passive, therefore some separation is advisable (see Boulevard Park).
- o If the property on the north is developed for commercialresidential uses as shown, then a trestle-type connection between the two areas would be acceptable.
- o If there is a justifiable need for more space for commercialresidential uses, then fill from the Brooks property south in phases would be acceptable.
- o Phased development is recommended to prevent any large unattractive area from developing at one time, and also to ensure that as each area is filled, it is promptly utilized.
- o Fill should not be allowed for industrial uses.
- o Existing Conservancy III designation would have to be modified to Urban II except near the park.
- o The use of unpolluted marine dredge spoils is acceptable.
- o The use of a rip-rap bulkhead is acceptable except in those areas where public access to the water's edge is an objective. In those areas, a more gradual and natural edge treatment may be desirable.

- o The extent of fill should be in keeping with surrounding land forms and should not extend past the existing 20-25 foot bathymetric contour.
- o The height and siting of new development should not conflict significantly with the proposed path on the rail right-of-way.
- o The bulk of development should be limited to protect views from the same path.
- o Parking should be provided near the railroad tracks.

4.13 Brooks Property to North Terminal

Land Use: Change from industrial to mixed residential/commercial and commercial use.

Rationale:

- o Commercial activity may relate to Tour Center at North Terminal.
- o Existing industrial uses are non-water-dependent.
- o Adaptation of the shoreline to accommodate water-dependent industrial uses in this area would require extensive modifications including significant dredging.
- o Industrial expansion for water-dependent uses is proposed for other areas.
- o Cornwall Avenue could be extended offering access to the area.
- o There is no existing waterfront space in the study area available for residential use.

Concerns:

- o Northern interface with Tour Center North Terminal area.
- o Similar concerns to those expressed for the preceding area.

Regulations:

o Residential and commercial development should be controlled so that public access would be provided for along the waterfront at limited cost to the City.

- o Design of northern area should be coordinated with Port plans for North Terminal.
- o For regulations concerning fill, see discussion under North Terminal. No fill should be allowed along the northwest face of southern end of this area.
- o For regulations concerning height and bulk of development see preceding section.
- o To the extent possible, any residential development should be sited to the rear or southeast edge of the area and not on the water side of Cornwall Avenue.

4.14 North Terminal

Land Use: Develop portion for Tour Center (commercial use) with fill potential at southwest end. Retain portion of existing industrial use.

- o If economically feasible, Tour Center should be developed to promote the City's economy, both downtown and on the waterfront.
- o Potential fill area is shown for future parking requirements.

 This would allow flexibility in use of existing Port areas.
- o Desirable to maintain Port's deep water potential at this site at least until an alternative location is developed.
- Long-term use of site for deep water Port is questionable due to local traffic congestion, lack of suitable freeway connection, and continuing requirement for maintenance dredging.
- o Fill would be in an industrialized area already environmentally altered, and should not cause any serious ecological impacts.
- o Tour Center offers opportunity to increase public access to waterfront for City residents at a limited cost of those residents.
- o Tour Center could be visually interesting.

- o Continued capability for industrial activity.
- o Parking.
- o Traffic.
- o Relationships to adjoining areas and to downtown Bellingham.

Regulations:

- o Fill should not extend past southwest end of main Port pier on Whatcom Waterway.
- o If a Tour Center is realized, then public access should be provided for residents of Bellingham as well as visitors.
- o Public access should connect to areas south along shoreline to the extent possible.
- o Type of bulkhead will depend upon type of use proposed.
- o Use of marine dredge spoils for fill is acceptable.
- o Fill could be used for parking in conjunction with Tour Center.
- o Any ferry activity would have to be scheduled to prevent conflicts with other peak traffic flows.
- o Modify shoreline designations as necessary to permit fill.

4.15 Georgia-Pacific Pulp Mill

Land Use: No change from existing industrial use.

- o The no-change refers to land use only. Reduction of existing air and water pollution and improvement of general aesthetics are highly recommended.
- o Industrial activities at G-P are not compatible with public access.
- o Even though the central waterfront location is not optimal for either the City or G-P, it is not reasonable to consider relocation.
- o Visually, Georgia-Pacific could be made more compatible through a coordinated painting and landscaping program.

- o Water pollution.
- o Air pollution.
- o Visual pollution.
- o Lack of public access.
- o Relationship of North Terminal.

Regulations:

- o Any City Street improvements in G-P area should include landscaping to soften visual impacts.
- O Georgia-Pacific in conjunction with the Waterfront
 Design District should conduct a study with the objective
 of upgrading the plant's appearance. G-P should implement
 the valid recommendations of the study through a program
 of maintenance painting utilizing a coordinated and
 visually pleasing color scheme and associated materials.
 The edges of the plant exposed to the public should
 be landscaped to improve the interface.
- o G-P's open water area next to Whatcom Waterway could be filled to the edge of the waterway.
- o An impermeable bulkhead should be mandatory if mercuryladen sediments are spoiled here.
- o Whatcom waterway dredge material could be used (assuming an adequate bulkhead design).
- o Recommendations concerning air and water pollution appear under general recommendations.

4.16 Whatcom Waterway - Whatcom Creek Plan

Land Use: Develop Whatcom Creek Plan for recreational use as proposed but retain Citizens Pier for commercial use.

- o Creek plan can provide focal point and limited water access for CBD and government areas.
- o Given G-P and Whatcom Fill this is the only significant waterfront recreational opportunity identified for downtown.

- o Citizens Pier offers the best potential for viewing industrial activities in Whatcom Waterway.
- o Central Avenue street-end will require significant funds to develop.
- o Citizens Pier can be developed with private funds and also provide public access.
- o Additional industrial space is available on Whatcom Fill. Industrial space not necessary between Holly Street and Roeder Avenue in this area.
- o Whatcom Creek Park development could lead to additional recreation-oriented commercial development in this area such as restaurants, taverns and shops. This could act as a buffer to industrial areas.

- o Potential conflicts between pedestrians and industrial traffic.
- o Access between Whatcom Creek Park and Citizens Pier.
- o Parking.
- o Aesthetics of mudflats during low tide.
- o Maintenance dredging of highly polluted sediments in Whatcom Waterway.

- o Emphasize shared industrial-commercial-recreational parking in this area.
- O Consider low dam and fish ladder as recommended in Whatcom Creek Plan. Study to provide continual body of water within park. However, this would conflict with one of the special recommendations of the master program.
- o Dredge spoil from Whatcom Waterway could be used in conjunction with expanded Whatcom fill or G-P pulp mill site. No other area of the shoreline is recommended for disposal of this material.

- o Retain Citizens Pier for commercial use with public viewpoint at end.
- o Provide access between proposed park area and Citizens Pier (will require coordination with upcoming traffic studies).
- o If and when Whatcom Creek Park develops, encourage restaurants and shops near creek.

4.17 Whatcom Fill

Land Use: Retain existing industrial use of fill area southwest of Roeder Avenue, with expansion capability provided at seaward end. Commercial use related to Whatcom Creek Park and marinas between Roeder Avenue and Holly Street.

Rationale:

- o Existing development on the fill is predominantly industrial and much of it is water-dependent.
- o Relocating industry out of this area and re-developing for a use that would possibly be more compatible with downtown is considered impractical.
- o It should be possible to maintain industrial use but upgrade the appearance of the area and provide limited public access.
- The sediments at the end of the existing fill are polluted.

 Expanded fill may actually improve environmental conditions in the area by burying contaminated sediments.

Concerns:

- o Visual pollution.
- o Air pollution.
- o Water pollution.
- o Public access.
- Edge conditions.

Regulations:

o Fill should not be allowed until existing non-waterdependent uses, including log storage, are relocated and this space utilized for water-dependent use.

- o Fill should only be allowed if it includes provisions for public access and landscaping.
- o Marine dredge spoils from any location in the Bay including Whatcom Waterway are acceptable for fill if an adequate impermeable bulkhead is guaranteed.
- o The maximum extent of the fill will be limited by the existing inner harbor line, but more importantly it should not conflict with the design for the Port's Harbor Expansion project.
- o The corners of the Whatcom Fill along the seaward edge should be reserved for public viewpoint and/or commercial restaurant activities.
- O Establish requirements for existing sand and gravel operations, including Olivine Co., to eliminate or minimize the amount of dust presently polluting this area.
- o There should be an overall design and landscaping plan for Whatcom Fill similar to that recommended for the South Terminal.

4.18 Squalicum Harbor and Harbor Expansion Area

Land Use: Emphasis on recreational use and pleasure boat moorage and associated facilities in expansion area and commercial boat moorage and associated facilities in existing harbor.

- o Existing harbor contiguous with Bellingham Cold Storage should be part of the fish processing center for Bellingham.
- o Proximity can be beneficial. With separation, conflicts between commercial and pleasure craft can be minimized.
- o Land adjoining I & J Waterway offers potential for commercial or industrial development.
- o Locating pleasure boats and related commercial areas in expansion space would increase proximity of public oriented facilities to downtown area.

o Separation of the two types of boating might mitigate parking problems and other potential conflicts.

Concerns:

- o Amount of covered moorage.
- o Space for dry moorage.
- o Parking (shared commercial-recreational parking concept in existing harbor causes some conflicts).
- o Water quality.

Regulations:

- o Covered moorage should be limited to approximately 15% of all moorage.
- o There should be greater emphasis on the use of dry moorage. Potential space exists in the harbor expansion area and the Whatcom Fill area.
- o Pleasure boat emphasis of expansion area should not preclude limited commercial moorage or industrial use adjoining I & J Waterway.
- o Sanitary waste pump-out facilities should be provided in the existing harbor as soon as possible.
- o Further consideration should be given to relocating

 Squalicum Creek back to the proposed boat harbor expansion area.

4.19 Bellingham Cold Storage

Land Use: Retain existing industrial uses. Relocate Bellingham Frozen Foods.

- o Bellingham Frozen Foods is non-water-dependent. It probably could and should be relocated off the waterfront and support a cold storage operation by itself.
- o Relocation would free up considerable fish processing, cold storage and warehouse space.

- Once BFF is relocated, and a need for expansion still exists, the Squalicum Creek area near the existing BCS Compound may be used.
- o Squalicum Creek has been relocated twice. The mouth of the Creek is not a very natural area at the present time.
- o A landfill at the mouth of Squalicum Creek Waterway is not necessarily incompatible with a healthy salmon run in the Creek.
- o Realignment of the creek to the east or west should also be considered, since in either case one contiguous area could be developed for industry. Benefits would be provided to either the harbor or to the park north of Mt. Baker Plywood.
- o Realignment would require considerable additional study to determine feasibility and, for this reason, has not been recommended.

- o Public access.
- o Aesthetics.
- o Squalicum Creek.
- o Expansion for a water-dependent use when a significant amount of space is being utilized for a non-water-dependent use.
- o Parking.

- o Bellingham Frozen Foods must be relocated and their space utilized for fish processing before any expansion is approved.
- o Prior to any fill near Squalicum Creek, the relocation of the creek channel should be re-analyzed.
- o In conjunction with fill at the head of the Waterway an elevated platform should be considered for public viewing of fishing boat load/unload activities.

- o Use of unpolluted dredge spoils is acceptable, particularly sediment in the Squalicum Waterway.
- o Edge treatment similar to that in existing BCS area is acceptable.
- o The maximum seaward extent of fill near Squalicum Creek is the existing boundary of the waterway.
- o There should be an overall design and landscaping plan for this area similar to that recommended for South Terminal. BCS should conduct and implement a design program with a coordinated color scheme to improve appearance of the plant. This program could be similar to the program proposed for the Georgia-Pacific pulp mill. BCS should also improve the appearance of the compound by landscaping to soften the appearance of the chain link fence. Existing non-water-dependent uses north of Roeder should eventually relocate and the space used in conjunction with BCS (parking) or Squalicum Harbor.

4.20 Mt. Baker Plywood Area

Land Use: Retain industrial use. Allow expansion of water-dependent industrial use on new fill.

- o Mt. Baker Plywood is water dependent only to the extent that logs are received by water.
- o Relocation would allow use of the entire area surrounding Squalicum Waterway to be used for fisheries related industrial activity.
- o Any fill area would have to be carefully designed to afford protection of the gravel beach to the west, but such a fill could be a Port or privately developed one and still allow for public access to a City-owned viewpoint area at the end of the fill.
- o The viewpoint could provide public education on aspects of the fish processing industry.

o Additional study would be desirable before permitting this fill.

Concerns:

- o Impact of fill on gravel beach.
- o Use of filled area.
- o Public access.
- o Existing encroachment.
- o Visual pollution.

- o Any existing encroachment of unauthorized and non-regulated fill activities in this area should be stopped immediately.
- o Consider relocation of Mt. Baker Plywood Company to Whatcom Fill and establishment of fisheries industrial park in this area.
- o Fill can be allowed in this area but only if it is
 to be used for a water dependent purpose and not additional
 dry land log storage.
- o The extent of fill along the western face should be dependent upon needs to protect the ecology while developing the recreational potential of the gravel beach area.

 The western face of the fill should be natural in appearance. It should have a gradual concave shape from the existing gravel beach to the proposed viewpoint at the outer end. The maximum seaward extent of fill should not exceed the existing inner harbor line.
- o The appearance of this area requires upgrading, particularly in relation to the proposed gravel beach park. A landscape buffer between the industrial area and the park would be desirable.
- o No fill should be allowed unless public access is provided for along western face.
- o The bulkhead should have a natural appearance with visual continuity between the gravel beach and the filled area.

- o Edge treatment of Squalicum Waterway face should be appropriate to the specific industrial use the area is put to.
- o Fill material should be carefully selected to be nontoxic to protect public health. Sand and gravel from the Squalicum Waterway should be acceptable.
- o Public access should be considered in conjunction with any future road improvements. Access along the northern edge of Roeder to the creek appears to be the most desirable location.
- o The design and landscaping plan for the BCS area should be extended to include the Mt. Baker Plywood area.

4.21 North Beach

Land Use: Change from limited use to recreational use.

Rationale:

- o Gravel beach offers only potential for recreational swimming in study area.
- o Potential for connection to future Little Squalicum County Park.

Concerns:

- o Relationship with industrial area.
- o Relationship with Columbia Cement Co. Pier.
- o Access.
- Nature of recreational development.

- o The park area should be buffered from the industrial area to the extent possible.
- o Private industrial access must be maintained to the pier.
- o Expansion of the pier should not be allowed.
- o Public access should be provided to the beach from the County park to the north. A joint Port/City/County plan for development is recommended.

- o Other than access to the pier on a limited basis, auto access to the beach area should be prohibited.
- o Recreational development should be minimal to protect the natural character of the beach.

IMPLEMENTATION

The two basic goals of this study have been (1) to provide a basis for updating the City's Shoreline Master Program as published in 1974 and (2) to provide background data and a definition of development alternatives for the current comprehensive planning process. The master program update and comprehensive planning process will involve several public presentations and hearings, and should provide an opportunity for the public input not made possible in this study. Obviously such input and public discussion are necessary prior to formalizing the recommendations presented herein. Development of a detailed strategy for implementing these recommendations is not within the scope of this study.

In order to refine land use recommendations, it may be desirable to obtain additional information pertaining to growth potentials and future space requirements for the various types of water-dependent industrial, residential, and commercial uses which are allowable in the coastal zone, based upon the criteria listed in the City's Shoreline Master Program. Such data could also provide the basis for additional City and Port actions to attract desirable types of industrial, commercial and residential uses to the waterfront.

An important emphasis of the study has been to increase public access to the waterfront, and recommendations have been made for access at specific sites. Public view access in certain industrial areas would be desirable where the view might be both an educational and entertaining experience. A potential problem associated with this recommendation is liability. There are several approaches which can be taken with regard to how view access might be provided and who would assume liability. On Port property, the City might lease access space from the Port and pay for liability insurance, or the Port itself might retain the land and assume this responsibility. On private

land, either a City lease or City ownership would be a viable alternative. Regardless of ownership or who pays the liability insurance, the most important consideration is how the public is to be separated from industrial activities. The more effective the separation, the less problems will be encountered. Design alternatives aimed at optimizing public access include raised platforms over the activities to be observed, or view areas separated by fencing or water or both. Each of these alternatives will need to be explored if public access is to be increased in industrial areas.

For future control of development within the coastal zone, it may be desirable to form a Waterfront Design District supervised by a Board including both professionals and lay persons, to review all proposals for substantial development. This Design Board could be advisory to the Mayor and City Council. It is within the best interests of everyone concerned that an effective communication system be established between the City, the Port, residential neighborhoods, the Central Business District and all waterfront businesses.

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APPENDIX A BIOTIC INVENTORY PLANT AND ANIMAL SPECIES

Unless otherwise noted, the following species lists are taken from the City's Shoreline Inventory of 1973. As noted in the Shoreline Inventory, these lists are not necessarily complete and a quantitative survey of species abundance and community make up has yet to be made. The organisms are listed with the habitat as they have historically occurred in the Puget Sound region.

MARINE MUD FLAT COMMUNITY

This community consists of only a few invertebrate species, each of which generally attains a high abundance. These tidal flats support scattered eelgrass colonies (Zostera marina) and a few types of algal beds. When submerged, this community provides a niche for Dungeness crab (Cancer magister), red rock crab (Cancer productus), and fishes such as the starry flounder (Platichthys stellatus), and staghorn sculpin (Leptocottus armatus). The upper substratum of mud and silt and the lower strata of sand and cobbles typically support the existence of these species:

Worms

Proboscis worm (Glycera rugosa)
Thread worm (Lumbriconereis sp.)
Tube worm (Axiothella sp.)
Capitellid worms

Arthropods

Ghost shrimp (Callianassa californiensis)

Mollusks

Cockle (Clinocardium nuttallii)
Bent-nose clam (Macoma nasuta)
Pink tellin (Tellina sp.)
Soft-shelled clam (Mya arenaria)
Butter clam (Saxidomus giganteus)
Littleneck clam (Protothaca staminea)

Mammals

Raccoon (<u>Procyon lotor</u>)
River otter (<u>Lutra canadensis</u>)
Mink (Mustela vison)

Birds

Great blue heron (Ardea herodias)
American coot (Fulica americana)
Mallard (Anas platyrhynchos)
Pintail (Anas acuta)
Green-winged teal (Anas carolinensis)
Blue-winged teal (Anas discors)
Common loon (Gavia immer) (45)
Arctic loon (Gavia arctica) (45)
Red-throated loon (Gavia stellata) (45)
Red-necked grebe (Podiceps grisegena) (45)
Horned grebe (Podiceps auritus) (45)

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Eared grebe (Podiceps caspicus) (45)
Brandt's cormorant (Phalacrocorax penicillatus) (46)
Pelagic cormorant (Phalacrocorax pelagicus) (46)
Cinnamon teal (Anas cyanoptera)
American widgeon (Mareca americana)
Shoveler (Spatula clypeata)
Bald eagle (Haliaeetus leucocephalus)
Ring-billed gull (Larus delawarensis)
Glaucous-winged gull (Larus glaucescens)
Herring gull (Larus argentatus)
Thayer's gull (Larus thayeri)
California gull (Larus californicus)
Mew gull (Larus canus)
Franklin's gull (Larus pipixcan)
Bonaparte's gull (Larus philadelphia)
Common tern (Sterna hirundo)
Semipalmated plover (Charadrius semipalmatus)
Killdeer (Charadrius vociferus)
Black-bellied plover (Squatarola squatarola)
Surfbird (Aphriza virgata)
Ruddy turnstone (Arenaria interpres)
Black turnstone (Arenaria melanocephala)
Common snipe (Capella gallinago)
Spotted sandpiper (Actitis macularia)
Greater yellowlegs (Totanus melanoleucus)
Lesser yellowlegs (Totanus flavipes)
Pectoral sandpiper (Erolia melanotos)
Baird's sandpiper (Erolia bairdii)
Least sandpiper (Erolia minutilla)
Dunlin (Erolia alpina)
Short-billed dowitcher (Limnodromus griseus)
Long-billed dowitcher (Limnodromus scolopaceus)
Western sandpiper (Ereunetes mauri)
Sanderling (Crocethia alba)
Greater scaup (Aythya marila)(46)
Lesser scaup (Anthya affinis) (46)
Common goldeneye (Bucephala clangula) (46)
Barrow's goldeneye (Bucephala islandica) (46)
Bufflehead (Bucephala albeola) (46)
Oldsquaw (Clangula hyemalis) (46)
Harlequin duck (Histrionicus histrionicus) (46)
White-winged scoter (Melanitta deglandi)(46)
Surf scoter (Melanitta perspicillata)(46)
Common merganser (Mergus merganser)(46)
Red Breasted merganser (Mergus serrator)(46)
Western gull (Larus occidentalis)(46)
Heermann's gull (Larus heermanni)(46)
Common murre (Uria aalge)(46)
Pigeon guillemot (Cepphus columba)(46)
Marbled murrelet (Brachvramphus marmoratum)(46)
Black brant (Branta nigricans)(46)
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MARINE TIDAL MARSH COMMUNITY

This community consists of emergent vegetation found at the edges of mud flats, backshore lagoons (brackish water), and fresh water deltas:

Glasswort (Salicornia sp).
Arrowgrass (Triglochin maritimum)
Saltgrass (Distichlis spicata)
Sedges (Carex sp.)
Rushes (Juncus sp.)
Plus many other less dominant species

Animal species found in these areas are usually the same as those found in the mud flats (see the preceding description). However, the greater cover and nesting area provided by the emergent vegetation usually increases the abundance and diversity of birds. Some additional species of birds to be found in these areas are:

Band-tailed pigeon (Columba fasciata) Rock dove (Columba livia) Great horned owl (Bubo virginianus) Rufous hummingbird (Selasphorus rufus) Red-shafted flicker (Colaptes cafer) Yellow-bellied sapsucker (Sphyrapicus varius) Belted kingfisher (Megaceryle alcyon) Downy woodpecker (Dendrocopos pubescens) Traill's flycatcher (Empidonax traillii) Violet-green swallow (Tachycineta thalassina) Tree swallow (Iridoprocne bicolor) Rough-winged swallow (Stelgidopteryx ruficollis) Barn swallow (Hirundo rustica) Cliff swallow (Petrochelidon pyrrhonota) Purple martin (Progne subis) Steller's jay (Cyanocitta stelleri) Common raven (Corvus corax) Common crow (Corvus brachyrhynchos) Black-capped chickadee (Parus atricapillus) Chestnut-backed chickadee (Parus rufescens) Bushtit (Psaltriparus minimus) Winter wren (Troglodytes troglodytes) Bewick's wren (Thryomanes bewickii) Long-billed marsh wren (Telmatodytes palustris) Robin (Turdus migratorius) Varied thrush (Ixoreus naevius) Swainson's thrush (Hylocichla ustulata) Golden-crowned kinglet (Regulus satrapa) Ruby-crowned kinglet (Regulus calendula) Water pipet (Anthus spinoletta) Bohemian waxwing (Bombycilla garrulus) Cedar waxwing (Bombycilla cedrorum) Northern shrike (Lanius excubitor)

Starling (Sturnus vulgarus) Hutton's vireo (Vireo huttoni) Orange-crowned warbler (Vermivora celata) Yellow warbler (Dendroica petechia) Audubon's warbler (Dendroica auduboni) House sparrow (Passer domesticus) Brown-headed cowbird (Molothrus ater) Western tanager (Piranga ludoviciana) Purple finch (Carpodacus purpureus) House finch (Carpodacus mexicanus) Pine siskin (Spinus pinus) American goldfinch (Spinus tristis) Rufous-sided towhee (Pipilo erythrophthalmus) Savannah sparrow (Passerculus sandwichensis) Oregon junco (Junco oreganus) White-crowned sparrow (Zonotrichia leucophrys) Golden-crowned sparrow (Zonotrichia atricapilla) Fox sparrow (Passerella iliaca) Song sparrow (Melospiza melodia)

MARINE SAND-COBBLE BEACH COMMUNITY

The lower areas of this intertidal zone support a good variety of free and attached algae: Monostronum sp., Fucus sp., Porfira sp., and many others. The sandier areas also provide a good habitat for eelgrass (Zostera marina).

Representative invertebrates of this community are:

Burrowing anemone (Anthopleura artemisia)
Flat worms (Notoplana sp.)
Miscellaneous Bryozoans and sponges

Worms

Proboscis worm (Glycera rugosa)
Irredescent worm (Hemipodus borealis)
Miscellaneous polychaetes (Nereis sp. and others)

Arthropods

Acorn barnacle (Balanus glandula)

Sand fleas (Orchestia sp.)

Isopods (Idothea sp.)

Shrimp (Crago sp. and Hippolyte sp.)

Hermit crabs (Pagurus sp.)

Spider crabs (Mimulus foliatus)

Dungeness crab (Cancer magister)

Red rock crab (Cancer productus)

Beach crabs (Hemigrapsus oregonensis and H. nudus)

Mollusks

Blue mussels (Mytilus edulis)

Cockle (Cardium corbis)

Bent-nose clam (Macoma nasuta)

Sand clam (Macoma secta)

Soft-shelled clam (Mya arenaria)

Butter clam (Saxidomus giganteus)

Littleneck clam (Protothaca staminea)

Basket shell snail (Nassarius sp.)

Purple snails (Thais sp.)

Many rayed starfish (Pycnopodia sp.)

Sea cucumber (Stichopus sp.)

Sand dollars (Dendraster excentricus)

Green sea urchin (Strongylocentrotus drobachiensis)

Vertebrates are generally similar to those already described in the mud flat community; additional fishes found here are:

Staghorn sculpins (Leptocottus armatus)
Spiny lumpsucker (Eumicrotremus orbis)
Starry flounder (Platichthys stellatus)
Lingcod (Ophiodon elongatus)
Rockfish (Sebastodes sp.)
Striped seaperch (Embiotoca lateralis)

LAKE, POND OR RESERVOIR COMMUNITY

Not all of the species listed below are expected to be found in the study area since the only site which represents this community type is the sewage lagoon.

Submerged plants

Pondweed (Potamogeton sp.)
Hornwort (Ceratophyllum sp.)
Bladderwort (Utricularia sp.)
Waterweed (Anacharis sp.)

Floating plants

Duckweed (<u>Lemna minor and L. trisulca</u>) Greater duckweed (<u>Spirodela</u> sp.) Water lily (Nymphaea sp.)

Emerged plants

Sedges (<u>Carex</u> sp.)
Horsetail (<u>Equisetum</u> sp.)
Arrowhead (<u>Sagittaria</u> sp.)
Cattails (<u>Typha</u> sp.)
Water plantain (Alisma sp.)

The dominant invertebrates in lakes are aquatic insect larvae, such as dragonfly, damselfly and mayfly nymphs, as well as numerous microcrustaceans and protozoans, and snails (Gyraulus sp., Physa sp. and Pleurocera sp.).

Representative vertebrates are:

Mammals

Raccoon (Procyon lotor)
Longtail weasel (Mustela frenata)
Mink (Mustela vison)
Beaver (Castor canadensis)
Muskrat (Ondatra zibethica)

Amphibians

Salamander (Plethodon sp.)
Northwest toad (Bufo boreas)
Pacific tree frog (Hyla regilla)
Leopard frog (Rana pipiens)
Bullfrog (Rana catesbeiana)

STANDING FRESH WATER

Birds

Common loon (Gavia immer) Western grebe (Aechmophorus occidentalis) Pied-billed grebe (Podilymbus podiceps) Double-crested cormorant (Phalacrocorax auritus) Great blue heron (Ardea herodias) Mallard (Anas platyrhynchos) American widgeon (Mareca americana) Bufflehead (Bucephala albeola) Hooded merganser (Lophodytes cucullatus) Common merganser (Mergus merganser) Sharp-shinned hawk (Accipiter striatus) Ruffed grouse (Bonasa umbellus) Ring-necked pheasant (Phasianus colchicus) American coot (Fulica americana) Killdeer (Charadrius vociferus) Spotted sandpiper (Actitis macularia) Glaucous-winged gull (Larus glaucescens) California gull (Larus californicus) Ring-billed gull (Larus delawarensis) Mew gull (Larus canus) Franklin's gull (Larus pipixcan) Bonaparte's gull (Larus philadelphia) Common tern (Sterna hirundo) Band-tailed pigeon (Columba fasciata) Rock dove (Columba livia)

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Great horned owl (Bubo virginianus)
Saw-whet owl (Aegolius acadicus)
Common nighthawk (Chordeiles minor)
Black swift (Cypseloides niger)
Vaux's swift (Chaetura vauxi)
Anna's hummingbird (Calypte anna)
Belted kingfisher (Megaceryle alcyon)
Red-shafted flicker (Calaptes cafer)
Yellow-bellied sapsucker (Sphyrapicus varius)
Hairy woodpecker (Dendrocopos villosus)
Downy woodpecker (Dendrosopos pubescens)
Traill's flycatcher (Empidonax traillii)
Western flycatcher (Empidonax difficilis)
Violet-green swallow (Tachycineta thalassina)
Tree swallow (Iridoprocne bicolor)
Rough-winged swallow (Stelgidopteryx ruficollis)
Barn swallow (Hirundo rustica)
Cliff swallow (Petrochelidon pyrrhonota
Purple martin (Progne subis)
Steller's jay (Cyanocitta stelleri)
Common raven (Corvus corax)
Common crow (Corvus brachyrhynchos)
Black-capped chickadee (Parus atricapillus)
Chestnut-backed chickadee (Parus rufescens)
Common bushtit (Psaltriparus minimus)
Red-breasted nuthatch (Sitta canadensis)
Brown creeper (Certhia familiaris)
Dipper (Cinclus mexicanus)
Winter wren (Troglodytes troglodytes)
Bewick's wren (Thryomanes bewickii)
Long-billed marsh wren (Telmatodytes palustris)
Robin (Turdus migratorius)
Varied thrush (Ixoreus naevius)
Swainson's thrush (Hylocichla ustulata)
Golden-crowned kinglet (Regulus satrapa)
Ruby-crowned kinglet (Regulus calendula)
Cedar waxwing (Bombycilla cedrorum)
Starling (Sturnus vulgaris)
Hutton's vireo (Vireo huttoni)
Red-eyed vireo (Vireo olivaceus)
Warbling vireo (Vireo gilvus)
Orange-crowned warbler (Vermivora celata)
Yellow warbler (Dendroica petechia)
Audubon's warbler (Dendroica auduboni)
Black-throated gray warbler (Dendroica nigrescens)
MacGillivray's warbler (Oporornis tolmiei)
Yellowthroat (Geothlypis trichas)
Wilson's warbler (Wilsonia pusilla)
House sparrow (Passer domesticus )
Red-winged blackbird (Agelaius phoeniceus)
Bullock's oriole (Icterus bullockii)
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Brewer's blackbird (Euphagus cyanocephalus) Brown-headed cowbird (Molothrus ater) Western tanager (Piranga ludoviciana) Black-headed grosbeak (Pheucticus melanocephalus) Evening grosbeak (Hesperiphona vespertina) Purple finch (Carpodacus purpureus) House finch (Carpodacus mexicanus) Pine siskin (Spinus pinus) American goldfinch (Spinus tristis) Rufous-sided towhee (Pipilo erythrophthalmus) Oregon junco (Junco oreganus) Chipping sparrow (Spizella passerina) White-crowned sparrow (Zonotrichia leucophrys) Golden-crowned sparrow (Zonotrichia atricapilla) Fox sparrow (Passerella iliaca) Song sparrow (Melospiza melodia)

CREEK COMMUNITY

The dominant submergent vegetation of the creeks consists of algae, such as <u>Spironema</u> sp., <u>Oscellatoria</u> sp., <u>Nostoc</u> sp. and others, and higher plants such as waterweed (<u>Anacharis</u> sp.). Emergent vegetation is often similar to that already described for the lake community, but with the conspicuous addition of many species of mosses. At various points, these streams pass through forest, grassland and modified communities and therefore have representative species of these communities (described elsewhere) along the shoreline.

Animals are again very similar to those found in the lake community. Some additional representatives are:

Invertebrates

Stonefly nymphs (many species)
Caddisfly larvae (many species)
Blackfly larvae (Simulus sp.)
Flatworms (Dugesia sp.)

Amphibians

Red-legged frog (Rana aurora)

Fishes

Chum salmon (Oncorhynchus keta)
Coho salmon (Oncorhynchus kisutch)
Brook trout (Salvelinus fontinalis)
Searun cutthroat (Salmo clarki)
Steelhead (rainbow) trout (Salmo gairdneri)

Not in Whatcom Creek

BROADLEAF FOREST COMMUNITY

Typical dominant vegetation types of the upper canopy are:

Birch (Betula occidentalis)

Big leaf maple (Acer macrophyllum)

Red alder (Alnus rubra)

Chokecherry (Prunus demissa)

Flowering dogwood (Cornus nuttallii)

Cascara (Rhamnus purshiana)

Cottonwood (Populus trichocarpa), usually in wet areas

Willows (Salix sp.), usually in west areas

Madrona (Arbutus menziesii), on bluffs near the sea

The shrubs and herbs of the understory are represented by:

Vine maple (Acer circinatum)

Blackberry (Rubus sp.)

Devil's club (Echinopanax horridum), in wet areas

Bracken fern (Pteridium aquilinum)

Nettle (Urtica lyallii)

Skunk cabbage (Lysichitum americanum), in wet areas

The vertebrates are similar to those listed for the lake and stream communities, with these additional species:

Amphibians

Western red-backed salamander (<u>Plethodon vehiculum</u>), adult stage Northwestern toad (<u>Bufo boreas</u>)

Reptiles

Western alligator lizard (Gerrhonotus multicarinatus)

Northern alligator lizard (Gerrhonotus coeruleus)

Pacific rubber boa (Charina bottae)

Northwestern garter snake (Thamnophis sirtalis)

Wandering garter snake (Thamnophis ordinoides)

Mammals

Opossum (Didelphis marsupialis)

Trowbridge shrew (Sorex trowbridgei)

Snowshoe hare (Lepus americanus)

Mountain beaver (Aplodontia rufa)

Yellow pine chipmunk (Eutamias amoenus)

Townsend's chipmunk (Eutamias townsendi)

Many species of bats

Douglas squirrel (Tamiasciurus douglasi)

Northern flying squirrel (Glaucomys sabrinus)

Deer mouse (Peromyscus maniculatus)

Long tailed weasel (Mustela frenata)

Mink (Mustela vison)

Mule deer (Odocoileus hemionus)

Cooper's hawk (Accipiter cooperii) Red-tailed hawk (Buteo jamaicensis) Kestrel (Falco sparverius) Ruffed grouse (Bonasa umbellus) Ring-necked pheasant (Phasianus colchicus) Barn owl (Tyto alba) Screech owl (Otus asio) Pygmy owl (Glaucidium gnoma) Short-eared owl (Asio flammeus) Common nighthawk (Chordeiles minor) Rufous hummingbird (Selasphorus rufus) Pileated woodpecker (Dryocopus pileatus) Western wood peewee (Contopus sordidulus) Olive-sided flycatcher (Nuttallornis borealis) Townsend's solitaire (Myadestes townsendi) Myrtle warbler (Dendroica coronata)

GRASSLAND, WEED, BRAMBLE COMMUNITY

This community is usually found along disturbed sites, such as road, forest, and stream edges, old fields, steep open banks, etc., and for convenience also includes residential lawns and gardens. Some of the dominant species of vegetation found in this broad category are:

Grasses

Fescue grass (Festuca sp.)
Brome grass (Bromus sp.)
Bent grass (Agrostis sp.)
Hair grass (Deschampsia sp.)
Wild rye (Elymus sp.)
Barley (Hordeum sp.)
Rye (Lolium sp.)
Panic grass (Panicum sp.)
Timothy (Phleum sp.)
Blue grass (Poa sp.)
Foxtail (Setaria sp.)

Flowers and weeds

Sedges (Carex sp.)
Onion (Allium sp.)
Fireweed (Epilobium sp.)
Horsetail (Equisetum sp.)
Nettles (Urtica sp.)
Smartweed (Polygonum sp.)
Dock (Rumex sp.)
Mouse-ear chickweed (Cerastium sp.)
Clematis (Clematis vitalba)
Clover (Trifolium sp.)
Cow parsnip (Heracleum lanatum)
Wild morning glory (Convolvulvus sp.)

Foxglove (<u>Digitalis purpurea</u>)
Yarrow (<u>Achillea sp.</u>)
Aster (<u>Aster sp.</u>)
Thistle (<u>Cirsium sp.</u>)
Goldenrod (Solidago sp.)

Brambles

Gooseberry (Ribes sp.)
Blackberry (Rubus sp.)
Blue elderberry (Sambucus cerulea)
Scotch broom

The characteristic invertebrates of this community are far too numerous to be generalized. Many of the vertebrates found in this ecosystem have already been listed as associating with the lake and creek communities. However, there are some others that are characteristic of grassland:

Reptiles

Northwestern garter snake (Thamnophis sirtalis) Wandering garter snake (Thamnophis ordinoides)

Mammals

Vagrant shrew (Sorex vagrans)
Pygmy shrew (Microsorex hoyi)
Shrew-mole (Neutrotrichus gibbsi)
Townsend's mole (Scapanus townsendi)
Coast mole (Scapanus orarius)
Cottontail (Sylvilagus floridanus)
Woodchuck (Marmota monax)
Meadow vole (Microtus pennsylvanicus)
Townsend's vole (Microtus townsendi)
Muskrat (Ondatra zibethica)
Northwestern jumping mouse (Zapus trinotatus)
Coyote (Canis latrans)
Red fox (Vulpes fulva)
Striped skunk (Mephitis mephitis)

Birds

Marsh hawk (Circus cyaneus)

MIXED BROADLEAF - NEEDLELEAF FOREST COMMUNITY

This community, being a mixture, contains the species in the broadleaf community plus these additions:

Upper Canopy

Douglas fir (<u>Pseudotsuga menziesii</u>) Western hemlock (<u>Tsuga heterophylla</u>) Western red cedar (<u>Thuja plicata</u>)

Understory species are represented by:

Skunk cabbage (Lysichitum americanum), in wet areas Trillium (Trillium ovatum)

Coral root (Corallorhiza sp.)

Wild ginger (Asarum caudatum)

Huckleberry, blueberry (Vaccinium sp.)

Salal (Gaultheria shallon)

Oregon grape (Berberis nervosa)

Snowberry (Symphoricarpos albus)

SPECIES LIST OF BENTHIC ORGANISMS IN BELLINGHAM BAY (From Webber, Ref. 6)

Phylum Annelida Capitella capitata Cirratulus cirratus Cirratulidae sp. Eunice kobiensis Glycinde armigera Glycinde picta Lumbrinereis bifurcata Maldane glebiflex Maldanidae Family Nephthys sp. Owenia fusiformis Pista sp. Terebellides stroemi Mixed Polychaetes Phylum Echinodermata Amphiodia occidentalis Cucumaria piperata Class Holothuroidea

Phylum Mollusca
Aninopsida sericata
Macoma nasuta
Mitrella gouldii
Mytilus edulis
Yoldia limatula
Mixed Molluscs
Phylum Arthropoda, Class Crustacea
Balanus crenatus
Cancer oregonensis
Crago franciscorum
Gnorimosphaeroma oregonensis
Hemigrapsus oregonensis
Pinnixa schmitti

Fishes caught in Bellingham Bay, using 10-foot otter trawl and 150-foot beach seine; April 1974- March 1975. Keying reference: Hart, J.L., Pacific Fishes of Canada (1973)

Arrowtooth flounder Bay goby Bay pipefish Blackbelly eelpout Buffalo sculpin Butter sole Cabezon Chinook salmon C-O sole Crescent gunnel Cutthroat trout Daubed shanny Dover sole English sole Flathead sole Great sculpin Herring High cockscomb Longfin smelt Manacled sculpin Pacific sanddab Pacific tomcod Padded sculpin Penpoint gunnel Pile perch Plainfin midshipman Ratfish Rex sole Rock sole Rosethorn rockfish Roughback sculpin Roughspine sculpin Saddleback gunnel Sailfin sculpin Sand lance Sand sole Sharpnose sculpin Shiner perch Shortfin eelpout

Atheresthes stomias Lepidogobius lepidus Syngnathus griseolinatus Lycodopsis pacifica Enophrys bison Isopsetta isolepis Scorpaenichthys marmoratus Oncorhynchus tshawytscha Pleuronichthys coenosus Pholis laeta Salmo clarki Lumpenus maculatus Microstomus pacificus Parophrys vetulus Hippoglossoides elassodon Myoxocephalus polyacanthocephalus Clupea harengus Anoplarchus purpurescens Spirinchus thaleichthys Synchirus gilli Citharichthys sordidus Microgadus proximus Artedius fenestralis Apodichthys flavidus Rhacochilus vacca Porichthys notatus Hydrolagus colliei Glyptocephalus zachirus Lepidopsetta bilineata Sebastodes helvomaculatus Chitonotus pugetensis Triglops macellus Pholis ornata Nautichthys oculofasciatus Ammodytes hexapterus Psettichthys melanostictus Clinocottus acuticeps Cymatogaster aggregata

Lycodes brevipes

Silverspotted sculpin Slender sole Slim sculpin Smoothhead sculpin Snake prickleback Soft sculpin Spearnose poacher Spiny dogfish Spinyhead sculpin Staghorn sculpin Starry flounder Steelhead Striped perch Sturgeon poacher Surf smelt Spiny lumpsucker Tadpole sculpin Tidepool sculpin Tidepool snailfish Threespin stickleback Tubenose poacher Tubesnout Wattled eelpout White-barred blenny White-spotted greenling Blepsias cirrhosus Lyopsetta exilis Radulinus asprellus Artedius lateralis Lumpenus sagitta Gilbertidia sigalutes Agonopsis emmelane Squalus acanthias Dasycottus setiger Leptocottus armatus Platichthys stellatus Salmo gairdneri Embiotoca lateralis Agonus acipenserinus Hypomesus pretiosus Eumicrotremus orbis Psychrolutes paradoxus Oligocottus maculosus <u>Liparis</u> florae Gasterosteus aculeatus Pallasina barbata Aulorhynchus flavidus Lycodes palearis Poroclinus rothrocki Hexagrammos stelleri

APPENDIX B
SUMMARY OF INTERVIEWS AND CONTACTS

SUMMARY OF INTERVIEWS AND CONTACTS

During the study, interviews were conducted with most of the major industries within the coastal zone. These interviews were conducted either in-person or by telephone and generally followed a similar format:

- 1. Identification of project and purpose of interview
- 2. Discussion of current operations, use of the site and problems
- 3. Seasonal variation in employment
- 4. Status of transportation and parking
- 5. Experience with soil and edge conditions
- 6. By-products and wastes
- 7. Future growth and plans
- 8. Public use of tidelands security problems
- 9. Desired changes on waterfront

The interviews, which were conducted under the above format, have been summarized in this appendix.

In addition to conducting relatively detailed interviews, several firms and public officials were contacted to obtain specific information relating to their areas of responsibility. Lists of persons and firms contacted during the study are also presented as follows:

FIRMS CONTACTED

Bellingham Cold Storage Bellingham Frozen Foods Bellingham Tug and Barge (Foss) Bornstein Foods Frank Brooks Lumber & Manufacturing Builder's Concrete Bumble Bee Seafoods Burlington Northern Chevron U.S.A. Columbia Cement Croy Construction Dahl Fish Fairhaven Realty Fairhaven Shipyards Georgia-Pacific R.G. Haley International Industrial Electric Lummi Indian Tribal Enterprises (LITE) Milwaukee Road

Mt. Baker Plywood U.S. Navy District Civil Engineer's Office Northern Engine Northwest Fuel Olivine Co. O.N.C. Motor Freight Pacific Pearl Seafoods Peter Pan Seafoods Puget Sound Freight Lines Puget Sound Launch & Chandlery Reid Boiler Works Sanitary Service San Juan Seafoods Schenk Seafoods Texaco 0il Uniflite Vita Foods Weldcraft Steel and Marine Yorkston Oil

PERSONS CONTACTED

Roger Almscaar Terry Gerrard Lt. Scaraglino Roger Sahlin J.J. Gordon John Garner Ken Thomas John Wiseman Dan Bison Dave Langford Hiram Arden Fred Weinmann Tom Boone John Beacon Jean Nelson Chuck Intelkofer Jim Parsons Ted Clarke John Pennell B.M. Yorkston Pete Gaasland Willard Muhlbeier Jay Bornstein John Arntsen Howard Lovejoy Wally Croy Corky Smith Bill Cannon Edith Ellis Carl Richards George Stefan Stan Dumas Pat McEvoy Mike Price Charlie Doucette Garey Portrey Tom Glenn Gary Swofford Bob Frank Jack Gunning Martin Asplund Wes Fahlstrol Ed Dahlgren J.J. Dunkak William Catlow Greg Foster Rick Kagley James Doud Bob Robertson Dick Stinson Pat Milliken Burgess Willison Bill Sinnett Eugene Richey Paul Razore

Terryl Nyman

Whatcom County Planning Jongejan/Gerrard U.S. Coast Guard Owner- former Wright Bros. Shipyards Burlington Northern Bellingham Public Works Bellingham Public Works Bellingham Public Works Bellingham Public Works Bellingham Fire Department Corps of Engineers Corps of Engineers State of Washington Dept. of Natural Resources Burlington Northern Burlington Northern Burlington Northern Trans. Development Associates Northwest Fuel Northern Engine Yorkston Oil Builder's Concrete Mt. Baker Plywood Bornstein Foods Puget Sound Launch & Chandlery Puget Sound Freight Lines Croy Construction Olivine Columbia Cement Reid Boiler Works Frank Brooks Lumber & Manufacturing R.G. Haley International U.S. Navy Texaco Oil Chevron U.S.A. Industrial Electric Fairhaven Realty Port of Bellingham Puget Power Vita Foods Weldcraft Steel and Marine Bellingham Cold Storage Bumble Bee Georgia-Pacific Georgia-Pacific Georgia-Pacific Fairhaven Shipyard Peter Pan Uniflite Bellingham Frozen Foods Milwaukee Road Whatcom County Parks Department O.N.C. Motor Freight Dahl Fish University of Washington

Sanitary Service

Northwest Air Pollution Authority

Bellingham Cold Storage

LOCATION:

Tenant of Port in Squalicum fill area

ACTIVITIES:

Loads and off-loads most of the shipping at its piers and operates warehouses and cold storage. Also processes and packages fish and fish by-products. Employment averages approximately 300 persons with limited seasonal variation.

TRANSPORTATION:

Arranges shipping for tenants. Utilizes significant numbers of rail cars (approximately 800 per year) and trucks. Most trucks use southern truck route for access to freeway. Most employees park outside of compound. Installation of security guard and fencing has reduced parking conflicts and congestion within the compound. All fish processors indicated limited use of air traffic.

WASTES:

Solid wastes, mostly cardboard, are disposed of by thermal reduction. Company wastewater from defrosting is discharged directly into the Bay.

RELATIONSHIP

WITH WATERFRONT:

Receives fish for processing by boat. Ships some products by boat. Most of the major tenants are water related. Cost effectiveness resulting from proximity of fish receiving, processing, storage and shipping.

CONCERNS:

Effects of present and future government regulations on fishing industry. More area required in waterfront location for fish processing. There should be more emphasis on commercial fishing industry. Squalicum Creek Waterway requires dredging. Present depth is approximately 19 feet.

FUTURE PLANS:

Dredging to 26 or 27 feet would allow BCS to service larger ships. Dredging within 50 feet of pier is Port responsibility. New construction underway on south side of site. New warehousing and repacking space are being provided. BCS, with Port approval, would like to fill and develop additional fish processing capability on the north side of Squalicum Creek. This area is presently used for storage and parking. Without the fill, the area has limited manufacturing potential because of the limited area. BCS proposes to maintain a single access point to Roeder from their compound. Access to the new fill area would be interior to their compound via an enlarged bridge across the waterway.

NOTE:

The following firms and agencies maintain office space within the BCS compound:

Allied Fish

Halibut Producers Co-op

Icicle Seafoods Swiftsure Fisheries Yankee Fish Company

Nooksack Farms

U.S. Department of Commerce Inspection

These firms occupy a relatively small area. Their business appears generally related to BCS and the processors. The firms were not interviewed during this study.

Bellingham Frozen Foods

LOCATION:

Tenant of Bellingham Cold Storage

ACTIVITIES:

Processes and packages vegetables from Whatcom and Skagit County. The production capability controls how much can be purchased from farmers. The following are production and employment related to each crop.

	Processing Period	Employment
Peas	4 July - 31 August	30
Beans	20 July - 31 August	100
Corn	15 Sept - 30 November	100
Carrots	1 Sept - 30 November	140

BCS provides storage. BFF is using old ARCO building on upland side of Roeder Avenue for storage.

TRANSPORTATION:

BCS handles all shipping by rail and truck. Most shipping is by truck while food is being processed. Truck traffic is significant. 90 - 95% of BFF related truck traffic uses southern truck route. Employees park outside of BCS compound in former ARCO tank area on upland side of Roeder.

WASTE:

Food processing, particularly peas and corn, generates significant amounts of solid waste. A local area farmer presently trucks these wastes away each day. In the case of corn, 75% of fresh corn which is trucked in must be trucked away by the farmer.

RELATIONSHIP

WITH WATERFRONT:

Although there is a close working relationship with BCS and the proximity to cold storage is advantageous, BFF does not utilize shipping and there is no direct relationship with the waterfront.

CONCERNS:

Rising costs of City services including sewer. There is no alternative to the use of City services. One-way direction of Roeder Avenue north of BCS area is inconvenient in terms of BFF traffic to Ferndale.

FUTURE PLANS:

Other than current construction on BCS site, no further expansion is planned at this time.

Bornstein Foods

LOCATION:

Hilton Avenue on Whatcom fill

ACTIVITIES:

Processing and packaging of bottom fish and salmon. Peak production period is March through November.

TRANSPORTATION:

All fish arrive directly by boat. Packaging materials are delivered by truck. Approximately 4 trucks of product and 4 dump trucks of scrap leave the premises each day. Rail service is not used. Parking is sufficient for the present

employment level only.

WASTES:

Seventy percent of the incoming fish, by weight, is scrap. That scrap is hauled to a landfill. All wastewater is passed through a hydrosieve and routed to the Post Point treatment plant.

RELATIONSHIP

WITH WATERFRONT:

Fish for processing arrive by boat.

CONCERNS:

There exist traffic and parking problems due to operations of Puget Sound Launch and Chandlery. Would like to see the establishment of a restaurant but expressed concern over increased traffic problems associated with it.

FUTURE PLANS:

Expansion is felt to be necessary in order to accommodate the increased catch resulting from the establishment of the 200 mile limit. Land area is a constraint. Acquisition of the land owned by Time Oil Co. is being considered.

Frank Brooks Lumber and Manufacturing

LOCATION:

Foot of Cornwall

ACTIVITIES:

The property in question is leased to Georgia-Pacific. The 130,000 square foot warehouse is used for storage

of tissue products.

FUTURE PLANS:

Would like to renew the 10 year lease with Georgia-Pacific when it expires in 6 years. If the Alaska Ferry Terminal is constructed, they would entertain the idea of selling the property so that it might be put to a higher use in relation to that terminal.

Builder's Concrete

LOCATION:

C Street on Whatcom fill

ACTIVITIES:

Produce concrete masonry, blocks and marine floating systems (e.g. docks, bridges). There is a seasonal variation in operations as in the construction industry. Production is reduced between November and February.

TRANSPORTATION:

One barge every two days supplies the plant with sand and gravel from San Juan Island. Columbia Cement receives one barge of gypsum and lime rock at the plant's dock every month. Pumice arrives by rail and expanded shale, lumber, cement, sand and gravel (10 loads per day) are delivered by truck. Concrete floats are shipped by truck (66%) and barge (33%). Thirty to forty loads of concrete are shipped out by Ready-mix trucks daily. Parking is somewhat of a problem when concrete floats are being stored on the site.

WASTES:

Dust from the loading of dry cement into mixer trucks has been controlled by the installation of a water spray ring that circles the loading chute. Daily washings from the concrete trucks are collected in a sedimentation basin.

RELATIONSHIP WITH WATERFRONT:

Receive significant portion of sand and gravel supplies by barge. Waterfront access is necessary for loading concrete floats on barges bound for Alaska.

CONCERNS:

Bellingham is not taking advantage of the potential of its marine-oriented land. The proposed improvement of Roeder Avenue will not eliminate bottlenecks at either end of the improvement.

FUTURE PLANS:

The amount of land available that is adjacent to the site is limited and there is no strategic significance to the present location. Therefore, if it were economically feasible and a large source of non-waterborne sand and gravel were available, relocation would be attractive. The contact's aim is to move to a different site within a 5 to 10 year period.

Chevron U.S.A. (land owned by Standard Oil Co.)

LOCATION:

1020 C Street

ACTIVITIES:

Storage and distribution of diesel fuels, gasoline, oil and other petroleum products for all of Whatcom County

and part of Skagit County.

TRANSPORTATION:

All goods received by barge (average of one per week). The company has one tank truck and one trailer to deliver

products to customers.

WASTES:

Safety controls and surveillance are used to avoid oil

spills.

RELATIONSHIP

WITH WATERFRONT:

Receive all goods by barge.

FUTURE PLANS:

None

Columbia Cement

LOCATION:

North boundary of study area

ACTIVITIES AND

TRANSPORTATION: Pipeline on pilings and access pier for the pumping of

dry cement from the cement plant to barges (a distance of 2400 ft.). No goods come in via that pipeline. Half of the production total is loaded through the pipeline. The remainder is shipped by truck or rail. Operations are somewhat affected by construction peaks. Minimum activity - 6 to 10 barge loadings per month. Maximum

activity - 16 to 18 loadings per month.

WASTES:

No wastes from loading operations.

RELATIONSHIP

WITH WATERFRONT: By nature, the operation is dependent upon waterfront

access.

Water depth at the end of the pier is small and the area CONCERNS:

> is slowly being filled in by sediments from the Nooksack River. At some point in the future, it may be too shallow for barges. Dredging is not feasible because too great an

area is involved.

In order to remedy the problem stated above, the pier FUTURE PLANS:

and pipeline may have to be extended at some undetermined time in the future. Expansion in capacity of the pipeline

is not foreseeable.

Croy Construction

LOCATION:

C Street and Roeder Avenue on Whatcom fill

ACTIVITIES:

General contracting, steel fabrication, storage of building materials. Variations in operations due to weather and economics. Peak period is from late February through

November.

TRANSPORTATION:

Have had one or two shipments by rail in 20 years. All steel, lumber and other construction items are shipped in and out by truck. Some trucking activity every day. Employees park

on lot.

WASTES:

A potential problem exists in the sandblasting operation. They are using DOE approved materails but there is still a dust problem. Contact felt that in the future, he may be required to control dust emissions, which at present.

blow across Roeder Avenue.

RELATIONSHIP

WITH WATERFRONT:

None

CONCERNS:

Considers waterfront to be an excellent area for heavy industries that require waterfront access. The land should be reserved for that purpose and the waterways should be improved for shipping. In favor of pollution controls and proposed Squalicum Harbor improvements.

FUTURE PLANS:

If they ever decide to expand, the present site is too small. Adjacent land is too expensive so they would relocate. Contact stated that he is open to sale of his land.

Dahl Fish

LOCATION:

601 W. Chestnut on Whatcom fill

ACTIVITIES:

Processing of bottom fish, salmon and crab. Peak activity

is between June and September. Low season is between

November and January. Peak employment is approximately 60.

TRANSPORTATION:

Fish are transported directly from the catcher boats. Fresh product is shipped out by truck twice a week. Frozen product is sent out by truck with no set schedule. There is adequate

employee parking on site.

WASTES:

Solids are shipped to a rendering plant in Blaine. Waterborne processing wastes flow directly through floor drains into the Bay. Connection to the Post Point treatment plant will be

accomplished within one year.

RELATIONSHIP

WITH WATERFRONT:

All incoming fish arrive by water.

CONCERNS:

Insufficient room for growth of industry and public access.

FUTURE PLANS:

None

Fairhaven Realty

LOCATION:

1100 11th Street. On slope above Uniflite and the south

Port facilities.

ACTIVITIES:

Realtor of commercial and investment properties

CONCERNS:

Would like to see a program of industrial upgrading and

maintenance (e.g. pick up litter, paint buildings)

FUTURE PLANS:

Present tenant activity is good and there exists a market for increased construction of multiple family housing on the hillside. There will undoubtably be more multiple

dwellings constructed in the near future.

Fairhaven Shipyard (Subsidiary of Weldit Steel)

LOCATION:

Tenant of Port in South Terminal

ACTIVITIES:

Repair of primarily commercial boats. Employment is presently 17 persons and will probably fluctuate somewhat with workload. This firm has been operating in this

location for only 2 months.

TRANSPORTATION:

Presently generating limited truck traffic (2-3 per day), but this will probably increase. There is adequate onsite parking for the present work force.

WASTES:

No significant by-products generated. Operations involve sandblasting which is done indoors when possible. Sandblasting outdoors is done only when wind conditions are favorable.

RELATIONSHIP

WITH WATERFRONT:

Most boat repair arrives by water and boats are worked on at the pier or hauled out using the marine rail system.

CONCERNS:

There is sometimes an odor problem from the sewage plant. There is an existing security problem partially caused by park walkway which borders the site on the south. Would like to see fencing increased or walkway eliminated.

FUTURE PLANS:

Port to repair existing piers. Would like to have existing marine railway upgraded to permit haul-out of larger vessels. May also add new ship construction at a later date. Present amount of space is satisfactory.

Georgia-Pacific

LOCATION:

300 W. Laurel Street

ACTIVITIES:

Produce pulp and paper products, lignin, chlorine, caustic soda, sodium chlorate, alcohol and sulfuric acid. G.P. has dry land log storage on the Whatcom fill and on airport property. There is also some log booming at the site of the proposed Squalicum Harbor expansion. The Georgia-Pacific Lumber Company is the only commercial operation on the site. G.P. owns all of the land it operates on except for a portion of the salt storage pad which they lease from the Port of Bellingham. Employment is 1,200. Log delivery, the only seasonal operation, is at its height during the summer.

TRANSPORTATION:

Some raw materials and the bulk of the log supply arrive by truck. Pulp is produced from logs (10%) and chips (90%). Chips are brought in by rail and barge. Up to 25 rail cars of chips and an additional 30 rail cars of materials arrive every day. Salt is delivered by ship. Products are shipped out by rail and truck but mainly by ship or barge. Employees park on site or on parking lots leased by G.P.

WASTES:

Water and air quality problems are discussed in detail in the text. However, certain specific points were discussed in the interview and are presented here. The sulfite waste liquor problem has been reduced by routing 80% of all the spent liquor through the alcohol plant which reduces the biochemical oxygen demand by 50%. A system is being designed which would increase recovery from 80% to approximately 98%. Waterborne wastes are passed through a clarifier and discharged into the Whatcom Waterway, causing foam and discoloration problems. Those problems should be reduced in the Waterway with the installation of the proposed outfall into the Outer Bay. Ninety-nine percent of the mercury from the chlorine plant is now recovered in the plant itself. The mercury settling pond is used only in emergency situations.

RELATIONSHIP
WITH WATERFRONT:

Highly dependent upon waterborne transportation.

CONCERNS:

Road transportation is a problem due to congestion and the fact that truck routes pass through the main commercial areas. Dredging of the Whatcom Waterway and disposal of the spoils are other major concerns.

FUTURE PLANS:

Log storage on the Whatcom fill should continue for at least 10 years as the land will remain to be unsuitable for construction until that time. Marine log storage may be phased out in the future. G.P. wholesale and retail operations, which are non-water dependent, will be relocated at some future time. They would like to eliminate the Burlington Northern Railroad main line that runs through the plant by having BN use the Milwaukee RR tracks. G.P. has plans for new facilities but they could not be disclosed at this time.

R.G. Haley International

LOCATION:

Foot of Cornwall

ACTIVITIES:

Production of engineered wood products such as power line

crossarms and molding and wood treatment.

TRANSPORTATION:

Two to three trucks per day supply 30% of the plant's raw materials. The balance is delivered by rail. The majority of outgoing interstate products are shipped by rail and a small amount is shipped by truck. All intrastate deliveries

are made by truck.

WASTES:

Wood shavings are baled and sold to chicken farmers.

RELATIONSHIP

WITH WATERFRONT:

None

FUTURE PLANS:

No foreseeable expansion. Can not expand due to lack of

available land. If the company decided to expand, it

would move to a new location.

Industrial Electric

LOCATION:

1030 C Street (C & Chestnut)

ACTIVITIES:

Industrial electric repatr and electrical contracting

TRANSPORTATION:

All freight moves in and out of the site by truck. The

company operates its own service trucks.

WASTES:

Negligible.

RELATIONSHIP

WITH WATERFRONT:

Provide electrical repair service to waterfront industries.

FUTURE PLANS:

None. Can not expand due to lack of available land.

Lummi Indian Tribal Enterprises (L.I.T.E.)

LOCATION:

Tenant of Schenk Seafoods

ACTIVITIES:

Processing of fresh salmon and herring. Employment is 7 year round with 15-20 additional seasonal employees

during the summer.

TRANSPORTATION:

Truck traffic generated primarily during summer to remove product for storage. Parking is along the southern edge

of Bumble Bee and within the marina area.

WASTES:

What cannot be processed is trucked out of area. Building

is connected to city sewer.

RELATIONSHIP

WITH WATERFRONT: Indian fishing boats dock next to processing operation

and unload. Proximity to unloading area is advantageous.

CONCERNS:

Employee parking is considered a problem.

FUTURE PLANS:

Indians hope to relocate processing operation to their

reservation within 2-3 years.

Mount Baker Plywood

LOCATION:

2929 Roeder Avenue

ACTIVITIES:

Production of hardwood and softwood plywoods. The inner plys are produced from raw logs and the veneer is purchased from various sources. There is no seasonal variation to production.

TRANSPORTATION:

Forty million feet of logs are delivered to the plant each year. From May through October, 30% of that is by truck, 70% by log raft. In the winter months, all are delivered by water. Eight railcar loads of veneer are received each week. The plant ships 3 railcar loads and 2 truck loads each day.

WASTES:

Dust from sanding and chipping operations and smoke emissions from boilers have been largely controlled by the installation of control equipment. However, extremely fine particles are not captured and present a nuisance problem in the nearby residential area. A wet scrubber will be installed in the near future to reduce hydrocarbon emissions from the veneer dryers. Plant wastewater passes through the Post Point treatment plant. Log transport and storage in the Bay is associated with water quality problems due to outer layer chipping and decomposition.

RELATIONSHIP

WITH WATERFRONT: Depends on water for transport of raw logs.

CONCERNS:

Not enough room to expand operations and increase dry land log storage. Dry log storage would reduce water quality problems and allow the logs to dry more fully for use as fuel in winter. There are also some road congestion problems on Roeder Avenue in front of the plant.

FUTURE PLANS:

Would like to expand operations so that they could peel both the inner and outer plys for the plywood. At present, only the inner plys (80% of the total used) are produced at the plant. The remainder have to be purchased. Mount Baker Plywood would like to see the reestablishment of a landfill area adjacent to their site that had no edge protection and has been almost totally eroded away.

Naval Reserve Training Center

LOCATION:

Hilton Avenue and Roeder Avenue on Whatcom fill

ACTIVITIES:

Classroom training once a week. Army reservists also

have class once a week. A recruiter is on duty every day.

TRANSPORTATION:

Reservists drive to and park on site.

WASTES:

Negligible

RELATIONSHIP

WITH WATERFRONT:

None

CONCERNS:

Litter and odor are problems in the waterfront industrial area.

FUTURE PLANS:

None. The possibility of relocation always exists, but it

is not probable in the immediate future.

Olivine

LOCATION:

Hilton Avenue on Whatcom fill

ACTIVITIES:

Crush, screen, air scrub, sack and sell olivine (a mineral composed of 50% magnesium oxide, 40% silica, 7-8% iron and traces of other minerals) to be used as a fertilizer filler or molding sand. They also use it to produce refractory material and fluid bed media for furnaces and wood waste burners. There is no seasonal variation in operations.

TRANSPORTATION:

Although barges from Cypress Island (15 miles south of Bellingham) used to carry 500 tons of raw olivine per month, that source is not being used at the present. Ten thousand tons per year are delivered by truck from the Twin Sisters Mines (35 miles east of Bellingham). Processed olivine and products are shipped out by truck. Employees (6) park on the shoulders of Hilton Avenue.

WASTES:

5,000 tons of olivine "flour" are stored in open piles on the site. There is a localized dust problem associated with them. Dust from the crushing operation is captured in a wet scrubber and the slurry produced is routed to a settling pond. The company will be adding a baghouse in the near future to further reduce dust emissions.

RELATIONSHIP

WITH WATERFRONT: Barge loading facilities are rented by other concerns.

Approximately 40% of past supplies of raw materials were delivered by barge, but none at present. Transportation

by barge may be reinstated (see below).

CONCERNS:

In favor of further landfill. Present land area is insufficient for industrial growth and areas of shallow water are non-productive. Bulkhead (wood piling) at waterfront is deteriorating but no real problems yet.

FUTURE PLANS:

Construction of a plant which would use the 5,000 tons of olivine "flour" and crushed olivine to produce magnesium oxide. The land north and east of the present site is being considered for construction of the plant and limited further expansion. If this plant were constructed, approximately 150 tons of olivine would have to be brought by barge from Cypress Island daily.

O.N.C. Motor Freight

LOCATION:

1014 Hilton on Whatcom fill

ACTIVITIES AND

TRANSPORTATION:

The company has a yard for parking 13 trailers and 10 small trucks. Their warehouse is used to unload incoming trailers and then load the goods onto the small trucks for dispatch within the Bellingham area. The reverse of this process is also carried out. There is no seasonal variation in operation or employment. Employees park on easement to adjacent property.

WASTES:

Negligible

RELATIONSHIP

WITH WATERFRONT:

None

CONCERNS:

Located on low area in which storm water accumulates. Roeder

Avenue needs to be expanded.

FUTURE PLANS:

None. Land availability is a constraint.

Pacific Pearl Seafoods

LOCATION:

Tenant of Bellingham Cold Storage

ACTIVITIES:

Processes and packages frozen crab and shrimp. Employment is 165-175 most of the time but has gone as low as 75-80. Only limited seasonal variation because product is received throughout year i.e. snow crab from January to June, shrimp from June to January and king crab from September to January.

BCS offloads the product and provides storage.

TRANSPORTATION:

BCS arranges for all rail and truck shipping. Most employees drive to work and park outside compound. Most use parking area north of Squalicum Waterway.

WASTES:

A & M By-Products picks up crab shell wastes for Pacific Pearl and Vita Foods twice per day. Liquid wastes are screened and discharged to city sewer.

RELATIONSHIP

WITH WATERFRONT: Although receiving is by BCS personnel, proximity to

receiving dock and cold storage is advantageous.

CONCERNS:

Parking should be better organized with more space.

FUTURE PLANS:

Expansion is a desirable goal but at present there is

neither available space nor definite plans.

Peter Pan

LOCATION:

Tenant of Port in South Terminal

ACTIVITIES:

Salmon processing. There is seasonal variation in employment with a summer high of 100 and a winter low of 5-6. Operations on this site began in 1975. Port

provides storage facilities and operations.

TRANSPORTATION:

Shipping handled by Port. This generates truck traffic in this area. Employee parking is outside the company's

security fence in whatever space is available.

WASTES:

Fish solid wastes are trucked off the site.

Liquid wastes are screened and discharged into city sewer.

RELATIONSHIP

WITH WATERFRONT: Most products now received by tender at end of pier.

Company hopes to receive product direct from fishing

boats in future.

CONCERNS:

Satisfied with present location due to lack of alternatives. Distance from marina and cold storage creates additional

transportation costs. Parking may become a problem.

FUTURE PLANS:

No other plans at this time; expansion limited due to lack of space. A lean-to is being constructed on the south side of the existing building and will be used

for fish head oil reduction.

Puget Sound Freight Lines

LOCATION:

Citizen's Dock (Whatcom Waterway) and Whatcom fill area

ACTIVITIES AND TRANSPORTATION:

Haul commodities such as aluminum, oil, pulp and paper products etc. by truck and barge. Substantial portion of operations is concerned with Bellingham waterfront industries. Interline connections with railroads in Bellingham. Slight fluctuations in operations based on world markets — mainly cyclical, but not seasonal. Citizen's Dock: Unloading of barges and some storage of goods. Connections to rail from barge must be made by truck. Truck terminal (Whatcom fill): Base of operations and parking for 19 tractors and 35 trailers of various lengths. Majority of hauling operations are single day trips so that the equipment is parked there every night.

WASTES:

Negligible

RELATIONSHIP

WITH WATERFRONT: Unload barges at Citizen's Dock

CONCERNS:

Would like to consider the construction of a marine/rail/ truck facility but require their own land or lease of land from Port. Contact felt that waterfront land was not available and Port lease terms were unfavorable. A 30 year lease with option to renew are the minimum desirable terms.

FUTURE PLANS:

Citizen's Dock: Storage could be done on barges or in Seattle warehouses. They are considering unloading barges at the Port facilities. May sell the dock. Truck terminal: May move in one or two years. Would like a location at the south end of Bellingham near Interstate 5.

Puget Sound Launch and Chandlery

LOCATION:

Whatcom fill area

ACTIVITIES:

Operate boat launch, 120 space dry storage marina (pleasure boats and a few gill netters) and provide ferry service of ship supplies to ships at Cherry Point. Winter employment - 1; summer employment - 4.

TRANSPORTATION:

Great deal of automobile and automobile with trailer traffic during the boating season. Parking is sufficient. During that time, there is also increased marina traffic in the vicinity of the boat launch/dock.

WASTES:

Negligible

RELATIONSHIP

WITH WATERFRONT:

The nature of the business requires waterfront access.

CONCERNS:

Insufficient public access to waterfront. Contact stressed that a balance is necessary between private industrial land and park lands. Would like to see an improvement of water quality in Bellingham Bay.

FUTURE PLANS:

Would like to construct a three floor building. The first two floors would be boat storage and the third floor would be a restaurant. Also would like to construct additional boat storage on sanitary landfill area once that ground

stabilizes.

Reid Boiler Works

LOCATION:

10th and Douglas

ACTIVITIES:

Fabrication of cannery equipment and pressure tanks

and boiler repairs. Eight employees.

TRANSPORTATION:

Raw materials are supplied by truck (average of less than one daily). Outgoing products are shipped by truck (15 per

month) and occasionally by rail.

RELATIONSHIP

WITH WATERFRONT:

None

CONCERNS:

Too little public access to waterfront.

FUTURE PLANS:

None in the foreseeable future. Company is considering

moving to an inland location near a railhead if they

ever decide to expand.

Sanitary Service

LOCATION:

1001 Roeder Avenue

ACTIVITIES AND

TRANSPORTATION:

The site has administrative offices and a parking lot for 10 refuse collection trucks. The company picks up residential refuse and takes it to the County incinerators. There is no seasonal variation in operations or employment. There is

sufficient on-site employee parking.

WASTES:

Negligible

RELATIONSHIP

WITH WATERFRONT:

None

FUTURE PLANS:

None

San Juan Seafoods

LOCATION:

Tenant of Bellingham Cold Storage

ACTIVITIES:

Processing and packaging of fish. Off-loading of ships and storage by BCS. Peak summer employment is 55 and minimum

winter employment is approximately 10.

TRANSPORTATION:

Shipping arranged by BCS. Most employee parking outside of compound. San Juan & Vita Foods employees must walk entire

length of compound to their cars.

WASTES:

Fish by-products processed by BCS. Very little solid waste;

liquid waste screened and discharged to city sewer.

RELATIONSHIP

WITH WATERFRONT:

Although off-loading is by BCS personnel, proximity to

dock and storage is advantageous.

CONCERNS:

Employee parking situation causes some complaints.

FUTURE PLANS:

Expansion is a desirable goal. This company was mentioned

by BCS as a possibility for proposed fill area north of

Squalicum Waterway.

Schenk Seafoods

LOCATION:

Squalicum Marina

ACTIVITIES:

Operates 2 freezer ships and 1 tender in Alaska during the summer. Crews for the ships are hired when it is time to sail; only the two owners and a secretary are

year round occupants.

TRANSPORTATION:

Crews do not park in the area for the entire summer.

The ships do not generate parking demand or trucking during

the winter.

WASTES:

The ships are not used during the winter so no significant wastes are generated except what is generated by maintenance

work.

RELATIONSHIP

WITH WATERFRONT:

Ships are moored in harbor during winter.

CONCERNS:

Insufficient moorage space for ships.

FUTURE PLANS:

No definite plans. Any plans would be limited by lack

of available moorage space.

Texaco Oil

LOCATION:

10th and Taylor

ACTIVITIES:

Storage and distribution of diesel fuels, gasoline, oil and other petroleum products. Three employees. There

is a slight seasonal variation in operations.

TRANSPORTATION:

Storage tanks filled by truck. The company has one truck for the distribution of barrels and package goods and two

tank trucks for liquid products.

WASTES:

Negligible

RELATIONSHIP

WITH WATERFRONT:

None

FUTURE PLANS:

None. No land available for expansion.

Uniflite

LOCATION:

Tenant of Port in South Terminal

ACTIVITIES:

Construction of fiberglass boats, mainly pleasure craft but also some work for the Navy. Employment varies from 400 to 500 with the peak pleasure boat construction occuring

from January to June.

TRANSPORTATION:

Bulk resin shipped in by rail. Most boats are shipped by truck. Employee parking is on-site, within a leased area in Fairhaven, and on-street where available.

WASTES:

No significant liquid waste. Solid waste is mainly wood and cardboard. Company hauls approximately 2 truckloads per week to Thermal Reduction.

RELATIONSHIP

WITH WATERFRONT:

Some boats are delivered by water. All boats are water tested

at the site.

CONCERNS:

If light manufacturing in this area increases, parking could become a problem. Lack of expansion space is a

problem.

FUTURE PLANS:

The company has no definite plans but is currently looking for suitable expansion area. The Wright Bros. site is an interim possibility. The company would be very interested in occupying possible fill area in Padden Creek mudflat. The company does not necessarily require additional direct access to water but would like expansion area adjacent to

present area.

Vita Foods

LOCATION:

Tenant of Bellingham Cold Storage

ACTIVITIES:

Processing and packaging of king crab, shrimp, snow crab and salmon. Warehousing by BCS. Employment ranges between 70 and 105. Limited seasonal variation in employment because product arrives all year. Busiest period is November to March, the main crab packing season. During the summer,

fresh product is processed.

TRANSPORTATION:

BCS arranges shipping utilizing both trucking and rail, whatever is available. Heaviest shipping requirements occur November through February. Lightest shipping in July and August. Parking available within compound for management only. Most employees park outside.

WASTES:

Most fish wastes processed by BCS for pet food. Crab shell is trucked off-site by A & M By-Products. Liquid wastes are screened to remove solids prior to

entering City sewer.

RELATIONSHIP

WITH WATERFRONT: Receives fish and crab for processing by boat. Most

receiving activity is during the summer when 50 to 100 boats are unloaded between 6 am and 2 pm each day.

boat repair and limited receiving during winter.

CONCERNS:

Effects of present and future government regulations on supply and costs. Increasing costs of crab shell disposal; A & M By-Products is having problems with neighbors and environmental standards. Cost to dispose at Thermal Reduction

would be considerably more than with A & M. Employees must walk approximately 1/3 mile from available parking. Commercial and recreational boating activities should be

separate.

FUTURE PLANS:

Would like to increase crab cutting capability by making addition to building owned by BCS. However, cost to

meet BCS design requirements is prohibitive.

Weldcraft Steel and Marine

LOCATION:

Squalicum Marina

ACTIVITIES:

Steel fabricating and machine shop. Repairs, maintains and provides storage for pleasure and commercial boats. Manufactures fiberglass pleasure and commercial boats in 28, 34 or 39 foot lengths. Employment reaches a winter

low of approximately 24 and a summer high of 47.

TRANSPORTATION:

There is no use of railroad and limited use of air freight. Approximately 3-7 trucks make pick-ups or deliveries daily. Limited on-site parking mainly reserved for customers. Employees park along southern edge of BCS fence and in

the public marina parking lot.

WASTES:

Solid wastes are picked up by City contractor. Ship's oil

is pumped into barrels and trucked off-site.

RELATIONSHIP

WITH WATERFRONT:

Most repair work involves fishing and pleasure boats arriving by water. New boats are generally launched at the site. The firm utilizes two dock spaces, a working dock where there are normally 6-7 boats tied up at one time and a float where 10-12 boats tie up for repairs.

CONCERNS:

Although there is no parking problem now, parking may become a problem in the future. Company believes there is insufficient leased space shown for pleasure boat repair in current Squalicum Harbor Expansion Plans.

FUTURE PLANS:

A separate pleasure boat repair shop is planned for the proposed marina expansion area. A retail marine supplies store may be added at the present location if the marina is expanded. If the street behind the shop could be vacated, then the dry storage area (which is located behind or upland of the shop) could be expanded.